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ABSTRACT

This report comprises the results of a panel commissioned by the New York State Board of Regents to review the status of knowledge on learning styles and group tendencies in learning behavior. The panel commissioned background papers, and debated various aspects of learning style as they relate to education. Of particular note was the role of culture and learning style, cognition, multiple intelligence, left brain-right brain development, and environmental conditions. The panel also considered pedagogy, instructional strategy, school organization and administration, diversity and educational equality and equity, and educational policy and practice as each related to learning style and behavioral tendency. The deliberations of the panel were consistently framed in the historical and educational experience of African-American and Latino American children in particular, and people of racial, ethnic, linguistic, and cultural difference in general. Recommendations are provided to advise the Board of Regents on how it might address these issues. Commentary on the recommendations is provided by Edmund G. Wilson, the Chairperson of the panel. A review of the knowledge base by Brenda A. Allen is included. The bulk of this report is comprised of the following position papers: (1) "Behavioral Style, Culture, and Teaching and Learning" (Asa G. Hilliard III); (2) "Learning Styles Dialogue" (Bernice McCarthy and Marcus Lieberman); (3) "Theories of Learning Styles, Neurosciences, Guided Imagery, Suggestopaedia, Multiple Intelligences and Integrative Learning" (Laurence Dean Martel); and (4) "Are Schools Responsible for Students' Failure?: A Synthesis of the Research on Learning Styles" (Rita Dunn, Jeffrey A. Beaudry, and Angela Klavas). Each of these reports includes an extensive list of references, and some of them use tables and figures to illustrate data. (BJV)

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REPORT OF THE NEW YORK STATE BOARD OF REGENTS'
PANEL ON LEARNING STYLES

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**REPORT OF THE NEW YORK STATE BOARD OF REGENTS'
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Note: The members of the Panel on Learning Styles are indebted to Dr. Brenda A. Allen for her work in support of the Panel's deliberations and in the preparation of the Panel's report.

PART I

A. ROSTER

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B. BACKGROUND

In August of 1987 the New York State Board of Regents issued the first edition of its publication, "Increasing High School Completion Rates: A Framework for State and Local Action." The publication, two years in preparation, was intent on stimulating discussion about approaches the New York State Board of Regents and local school districts might explore to respond to the high rate of noncompletion of high school among African-American and Latino American students. The report was well received. It was consistently referred to as an excellent document. Generally, the object of planned and spontaneous discussion throughout the State, the publication generated substantial and important discussion.

One section of the report provoked important and sustained controversy. This is not to say that there were no other issues in the publication that were the object of substantial criticism. There were many such issues. Topics dealing with Bilingual Education, Occupational Education, and Special Education were all the object of criticism because the publication failed to do an adequate treatment of the conditions and needs confronting students in these programs. However, the matter of learning styles and appropriate teaching strategies evoked the ire and opposition of some educational organizations and some educational leadership persons. The criticism had a particular sting because the media, in reporting the controversy, lost the context for the learning styles treatment, contributed to misunderstanding about the topic, and created polar positions from which proponents and opposition could or would not compromise. Attempts to revise the controversial passage resulted in additional generalizations about group tendencies and learning styles. The generalizations provoked more controversy. In this atmosphere, the Board of Regents determined that a review of current research and practice on learning style was essential to the treatment of this question before the preparation of a second edition of the publication "Increasing High School Completion Rates: A Framework for State and Local Action."

A carefully configured panel of scholars and practitioners, chaired by Professor Edmund W. Gordon of Yale University, was installed and asked to advise the Board of Regents concerning the current status of knowledge on learning styles and group tendencies in learning behavior. To accomplish this the panel, supported by private resources, commissioned background papers on learning styles and behavioral tendencies, convened themselves in a public hearing, participated in a closed working session, and responded to draft reports and recommendations. Through the spring and summer of 1988, the panel debated various aspects of learning style as they relate to education. Of particular note was the role of culture and learning style, cognition, multiple intelligence, left brain-right brain development, and environmental conditions. The panel also considered pedagogy, instructional strategy, school organization and administration, diversity and educational equality and equity, and educational policy and practice as each related to learning style and behavioral tendency. The deliberations of the panel were consistently framed in the historical and educational experience of African-American and Latino American children in particular, and people of racial, ethnic, linguistic and cultural difference in general.

The recommendations which follow are intended to advise the Board of Regents with respect to how it might proceed with subsequent treatments of these issues. Unanimously, the panel supports the initial action taken by the Board of Regents to publish the paper on Increasing High School Completion. Similarly, the panel commends the inclusion of the section on learning style and appropriate teaching strategies even though the section was too generalized and decontextualized.

The panel wishes to encourage the Board of Regents to publish a second edition of "Increasing the High School Completion Rates: A Framework for State and Local Action," and to include a treatment on learning styles and behavioral tendencies. The material that follows will, in judgement of the panel members, contribute to educational programs and policies that will seek to increase the rate of high school completion throughout the State.

C. THE RECOMMENDATIONS OF THE PANEL

It is recommended that the Board of Regents:

1. reaffirm its commitment to the purpose and spirit of the policy reflected in its publication, "Increasing High School Completion Rates: A Framework for State and Local Action" as it relates to the importance of pedagogical sensitivity to the diverse characteristics of the students served by the elementary and secondary schools in New York State;
2. affirm its commitment to periodically review and update this policy and the related publications to insure that they do not become static, to update these policies regarding the populations addressed, and to avoid stereotyping as we search for new strategies by which to serve different and newly addressed populations;
3. avoid the use of language and construction which is generalized to entire populations with no recognition of the amount of diversity within all groups of students;

Thus, reference to specific cultural, ethnic, or language groups may include behavioral tendencies thought to be encountered in high frequency within a particular group, but the fact of variance within such groups should be made explicit. Where examples are used, it should be made clear that there may not be universal agreement that such manifestations exist but that the point of the example is to call attention to the importance for pedagogy of the possibility that a particular learner or group of learners may function in ways that are different from those of the teacher or those traditionally encountered in schools.

4. affirm that learning style and behavioral tendency do exist and that students from particular socialization and cultural experiences often possess approaches to knowledge which are highly functional in the indigenous home environment and can be capitalized upon to facilitate performance in academic settings;

Care must be taken to avoid devaluing the styles or behavior tendencies of all students, while simultaneously respecting the multiple ways of knowing and using knowledge, and expanding the learning repertoires of all students. Teachers and school administrators must develop strategies that enable students to acquire and master knowledge skills appropriate to all aspects of formal schooling.

5. encourage and support continued development of and experimentation with strategies and techniques designed to advance knowledge and practice relative to complementing learner characteristics and learner experiences;

This recommendation is made despite the immaturity of our knowledge concerning Trait Treatment Interaction but in the light of the conventional wisdom that supports the notion that more effective teaching and learning strategies are to be found in the better understanding of these interactions. (See bibliography).

6. endorse the concept of educational equality which goes beyond the concept of distributional equality to embrace distributional sufficiency in response to special needs as the basis for social justice in education;

The traditional view of social justice supports the notion that public resources and services should be equally distributed among the members of a society. In the distribution of educational services, this idea has dominated. However, our concern with and respect for group and individual differences in the

characteristics of learners force a shift in perspective with respect to social justice. Following arguments advanced by Rawls (*A Theory of Social Justice*), it is argued that equity requires not sameness and equal distribution, but appropriateness and sufficiency to meet educational need. In keeping with this view, the resources and services of the society may be unequally distributed if that distributional inequity reduces the disadvantaging of the weakest members of the society. Special sensitivity to the learning characteristics and styles of students who do less well in our schools is but a reflection of this concept of social justice.

7. actively promote differential teaching strategies for differential learning styles and achievement patterns;

Provisions in regulation and budgetary incentives should be established to permit, encourage, and suggest organizational realignments and resource utilization at the school level, to advance stylistic flexibility, learning to learn, the celebration of differences, informal learning structures, and any other differential teaching strategy that has the potential to advance the achievement pattern of particular students by approximating or complementing their learning style or behavioral tendency.

8. Investigate the feasibility of adding to the requirements for the completion of teacher preparation and certification, competence, skill and understanding relevant to differences in the characteristics and learning behaviors of the diverse populations served by the elementary and secondary schools of the State of New York;

One way of increasing pedagogical sensitivity to diversity in learner characteristics is to insure that education and certification for the teaching profession give emphasis to understanding the facts of human diversity and approaches to accommodating it in instruction. This emphasis is implicit in extant procedures. The intent of this recommendation is to make the emphasis more explicit.

9. continue to advance its commitment to diversity with special concentration on those situations where schools and home environments are such that interaction with culture, language, ethnic or racially different peoples or communities is unlikely.

This should not be interpreted as a retreat from the opportunity the Board has to strengthen multi-cultural and multi-lingual understanding throughout the State of New York, but particularly in the metropolitan areas of the State. Inherent in the confluence of peoples and cultures in certain areas of the State is a rich plurality that has been and will continue to be central to the well being of the political, social, and economic future of the State. Schools, their culture, personnel, and instructional programs must be guided by the Board of Regents to advance the common good by diversifying the nature and character of the schooling experience such that it approximates, complements, and supports the diversity of the school population and its community. In settings where inherent opportunities do not exist because the community and its schools are more homogeneous, the Board of Regents must emphasize the special responsibility of schools to insure that curricula, unique experience, and instructional materials that inform about diversity are omnipresent in the schooling experience of enrolled students.

D. COMMENTARY

The New York State Board of Regents' symposium on learning styles was stimulated, in part, by the persistent concern for the disproportionate number of African-American and Latino American youths who fail to complete a high school diploma. Please note that in referring to African-American and Latino American children as a group we do not wish to imply that there does not exist a vast amount of heterogeneity within these populations. In both cases, the number of children who experience school

failure tend to be disproportionately from the low income brackets of these ethnic populations. Statistics reveal that while African-American and Latino American youths make up approximately 33 percent of the state's public school population, collectively they account for, minimally, 46 percent of New York State's high school dropouts (Freeborne and Hamer, 1987). Such a preponderance of academic failure is surely cause for immediate action. However, of more central interest to the symposium is the issue of "learning style" and particularly whether culturally distinct groups can be characterized by a specific set of behavioral motifs which influence the way they perceive and process information.

The general notion of learning styles as prevalent manners of approaching, obtaining and processing information from one's environment (Messick; Dunn) is widely accepted by educators. However, controversy arises when such stylistic preferences are used to characterize groups of people, especially groups identified along ethnic or cultural lines. It is to this latter issue that the present paper is addressed.

In a society where racist and sexist attitudes and practices are ubiquitous, it is difficult to engage in a dispassionate discussion of manifest differences between groups of human beings who also differ in their assigned status. For example, efforts to focus on the distinctive characteristics of women are easily suspected of being motivated by a concern for discriminating against or otherwise demeaning women. Recent efforts at focusing on the possibly distinctive learning styles of African American and Latino American children as a way of improving our efforts at educating them have become a subject of considerable controversy. Several factors form the context for these volatile issues:

1. Any effort to generalize with respect to all members of a group is dangerous and likely to be suspect;
2. So much effort has been directed at developing support for the notion that all people are equal and entitled to equal access and treatment that any focus on possible differences is likely to be interpreted as an argument for inequality;
3. European and masculine cultural hegemony in the United States have led us to consider human characteristics which vary from these models as inferior or deficient rather than simply different;
4. With respect to education, research and technology are as yet incapable of providing definitive guidance as to how we are to use the facts and knowledge of group and individual differences to improve education.

Given the political sensitivity of the question and the pedagogical ambiguity of possible solutions it is understandably difficult to bring dispassionate attention to bear on relevant policy decisions. Nonetheless, we find three traditions relative to education and diverse human characteristics. The oldest tradition, born of ignorance and outdated conceptions of fairness, is to disregard differences, to treat every student the same, and to accept survival of the fittest. The second involves the historical struggle to establish the view that all children are equally deserving of the best and most appropriate education available. Proponents of this view tend to concentrate on equal access and equal exposure to the best generic treatment. Strong elements of these two traditions exist alongside the growing trend in education of professed concern for adapting learning experiences to the unique characteristics of different individual, and groups of students.

It is the latter two traditions or trends which have generated the greatest political and professional debates, probably because both have radical implications for the economy, the profession, and the society. However, it is the third trend which best reflects emerging conceptions of social justice which require not distributional equality but resource distribution which is sufficient to the needs of the targeted population or individual. This is probably best exemplified in the diagnostic and prescriptive approach to modern medicine.

In its most recent form the debate has focused on possible differences in learning styles and other

learning-related characteristics as reflected in applications and reviews by Dunn, Beaudry, Gardner, Klaus, Martell, and McCarthy. Although these perspectives have by no means been universally accepted, it is the works which target African-American learning styles and the relevant claims of Boykin, Hale, and Hilliard which have inflamed the debate. These investigators point to a variety of behaviors which their data show to occur in high frequency among African-American children. They conclude that more effective education with African-American children will require that we give more attention to these behaviors. In some instances we will need to complement many of these African-American behavior tendencies. In other instances where such behavior is thought by some to be dysfunctional to the achievement of excellence in academic work, we will help these children to overcome, compensate for, or eliminate these behaviors. Thus the two most prevalent interventions concentrate on either matching the indigenous characteristics or offsetting them. In contrast to these, Gordon has emphasized the importance of the adaptation of learning experiences to better complement the learning behavior of the learner. In this model, the objective is to find the match, challenge to, or circumvention which best facilitates the learning behavior of the learner. This less mechanical approach reflects more dynamic and dialectical teaching and learning strategies targeted on the fluid needs of specific learners.

The question of learning styles is itself confusing. We like to distinguish between "learning styles," "behavior tendencies," and "cultural mores." In the classic connotation, "learning styles," according to Messick, is a prevalent manner of approaching, obtaining, and processing information from one's environment. It is thought to be relatively consistent and, like temperament (a consistent affective pattern), is thought by some to reflect some possible underlying biological phenomenon. Field dependence, reaction time, arousal state, speed of conceptual closure and biological rhythms are examples to which we sometimes refer. There is little definitive evidence which ties these dimensions of learning style consistently to specific cultural, ethnic, or sex groups. The evidence on field dependence is somewhat equivocal since there is a slight tendency for high status groups to favor field independence and for low status groups to favor field dependence.

"Behavior tendencies" appear to be less fixed and function much like habits and other learned behaviors. They may be more situation-specific but are not situation-bound. Precision in the use of language and numbers, inductive reasoning, planning and self-correction in problem solving are examples of tendencies to behave in certain ways. These behavior tendencies are thought to reflect the experiences of the learner. These experiences may be specific to the individual or common to the group in which the behavior has been learned. Thus we may see several members of a particular group showing the same behavior tendency, leading us to generalize concerning the behavior and group members.

"Cultural mores" are ways of behavior that are typical of persons socialized to membership in the same culture. Here we see attitudes toward academic learning, stylistic variations in the use of language, orientation toward people rather than objects, communal/cooperative vs. competitive behaviors in learning. These mores tend to adhere to cultural group membership. These characteristics which may be important manifestations of one's group identity may thus be the most difficult to change and the most fateful for the design of educational intervention.

Our understanding of the learning styles issue requires some distinction between these three categories of behavior since they lend themselves to differential interpretations and generalizations. However, no amount of semantic differentiation can prevent the debate and distortion when the question is raised concerning differences in the characteristics and functioning of human beings who enjoy or suffer different statuses in an essentially racist society. Under the influence of racism, motives become suspect; fears are raised relative to the misuse of otherwise benign information; old political battles are revisited, often with a less than adequate understanding of the central issues; and the victims of both racism and of a less than adequate education continue to suffer.

Although the term learning style has been used to infer differences in learning behaviors by groups of people divided along a variety of lines, the rise of research on ethnic differences in stylistic tendency has resulted in the emergence of the terms "behavioral style" and "cultural style" (Boykin; Hilliard). While both individual and group characteristics are thought to arise from many sources, the

latter are thought to primarily reflect specific socio/cultural experiences. Thus, when discussing the stylistic preferences of ethnic groups it may be more precise to employ the term cultural/behavioral style and to understand the relationship between culture and the development of stylistic preferences.

The term culture is often used to distinguish groups of people in terms of pervasive attributes such as national identity, socioeconomic status, geographic boundaries, developed technologies, belief systems, and mores. The term, however, actually refers to dynamic patterns of learned beliefs, values, mores, and ritualistic behaviors common to a group of people who share phenomenological, geographical, and historical proximity. The phenomena of culture consist of complex processes by which beliefs inform the development of core sets of values which in turn dictate the mores, technologies, and behavioral styles of a group of people. Thus, stylistic preferences observed between groups of people are in essence the behavioral manifestation of a complex interaction between beliefs, values and cultural styles.

While culture itself may consist of beliefs, values, and behavioral styles, the means by which culture comes to influence behavior is called the socialization process. Socialization, in general refers to the preparation of children to take on adult roles and responsibilities in society. However, cultural socialization, in particular, connotes the indoctrination of children into the mores and familiar laws of a specific culture. Such preparations are said to take the form of childrearing practices; yet implicit in these practices is the teaching of beliefs, values and culturally sanctioned behavioral styles. It is argued that cultural teachings are passed on by a variety of sources, including parents, teachers, and peers such that over time beliefs and values become internalized while the behaviors become habitual. Thus, successful cultural socialization is the result of the internalization of cultural beliefs and values which justify the manifestation of certain behavioral/cultural styles.

In the most ideal cases the cultural socialization imperatives emanating from within the home are consistent with those from other major socialization agents and institutions, namely the teachers and the schools. As such, the previously outlined depiction of the cultural socialization process may perhaps approximate the process at work in the lives of individuals who are characterized as monocultural, and who belong to the dominant or defining social order. However, such a depiction of cultural socialization would prove problematic in understanding the processes at work in the lives of individuals who do not enjoy this majority status and/or individuals who must negotiate competing socio-cultural realities simultaneously. African-Americans and Latino Americans are two such groups of individuals.

In attempting to characterize the cultural reality of subpopulations within a dominant society several experiential realms must be depicted. These realms of experience most often include the shared experiences of the subpopulation with the dominant culture, the shared experiences of the subpopulation with other disenfranchised groups, and the shared experiences of the subpopulation with other individuals of the particular ethnic group. Briefly, the first experiential realm refers to beliefs, values and cultural styles common to most members of a dominant social order. The second realm denotes certain behaviors and coping mechanisms developed by many minorities within a dominant society. The final realm refers to the beliefs, values and cultural styles common to members of a particular cultural group. Boykin (1983) uses this particular framework to outline the aspects of African American culture, in particular; however, such a framework appears to be applicable to any culturally distinct group within a dominant social order such as Latino Americans or Native Americans.

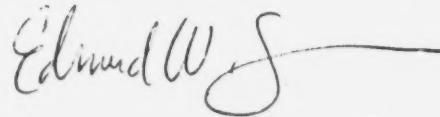
It must be noted that these experiential realms faced by minority cultures in a dominant society require very distinct and largely nonoverlapping psychological/behavioral repertoires. Within each repertoire is a set of norms, rules, and standards which guide these behaviors. Accordingly, most minority groups must attempt to simultaneously negotiate within several distinct cultural realms. In addition, the reality for such individuals is further complicated by inter and intra group differences such as gender, class, and national origin. Hence the overall cultural ethos may be more complex than that of the monocultural ethos and as such, a depiction of their stylistic preferences may require a very complex system of analysis.

The outcomes of such complex cultural systems are numerous and depend greatly on factors such as the degree of fit between the subculture and the demands of the dominant culture, the status of the minority group within the dominant social order, as well as the extent to which a group's ethnic cultural

experience is recognized and respected. Moreover, we must remain mindful that although the three experiential realms are common to all subpopulations, the degree of participation in any given realm varies greatly within a particular ethnic group as well as across ethnic groups. Thus, we witness vast levels of heterogeneity within and across ethnic group populations, making the tendency to stereotype such groups grossly inappropriate.

We can glean from the discussion above that socialization experiences play a great role in the transmission of culture and that the cultural transmission process can result in the acquisition of specific cultural/behavioral styles. However, to-date most of the literature on the cultural styles generated from research on the African-American and Latino American cultures has been inconclusive and conclusions are speculative. Nonetheless, there is a rich literature on stylistic differences in the learning behavior of students. There are sound reasons for believing that some of these differences adhere to groups defined by differential cultural experiences. The "wisdom of practice" and some empirical evidence support the notion that instruction which is informed by sensitivity to these differences contributes to the effectiveness of learning. although this latter conclusion finds little support in the accumulated studies of efforts at matching learner traits and instructional practice, among the reviewers of this body of work there continues strong intuitive support for the paradigm. This implicit logic is reflected in the practices of many good teachers as they try to adjust learning environments and instructional strategies to the unique characteristics and needs of specific learners. There is probably no notion referable to education which is more honored, at least in rhetoric, than is individualization of learning. In our concern for adapting instruction to the typical learning behaviors of learners, whether called learning style, cultural style, behavioral style, or something else, we are honoring one of the best traditions in education and may also succeed in reducing school failure.

Respectfully Submitted,



Edmund W. Gordon, Chairperson

PART II

E. REVIEW OF THE KNOWLEDGE BASE

The following section consists of a summary of the various paradigms and traditions represented in the literature on stylistic preferences. The section is divided into three parts: (1) a review of the work on individual differences in learning style; (2) a review of the work on ethnic group differences in learning style; and (3) a review of the literature on culturally specific stylistic behaviors.

Individual Differences

The term "learning styles" traditionally has been used to infer individual differences in approaches to learning. It is argued that such stylistic preferences are developmentally and biologically imposed characteristics which occur over time due to certain interactions with the environment (Dunn, 1987; McCarthy, 1988; Thies, 1979; Restak, 1979). Some learning style advocates maintain that stylistic preferences can be divided into perceptual styles and cognitive styles where the former refers to how we perceive stimuli and the latter connotes how we process what has been perceived (Kolb, 1984; McCarthy, 1988). Others, however, assert that learning styles can be depicted by a comprehensive model which includes physiological, affective, environmental and sociological factors which converge to influence information processing (Dunn and Dunn, 1987; Keefe, 1982). While the two learning style camps differ in their conceptualization of how stylistic preferences effect cognitive processing, both suggest that the contextual conditions under which information is perceived and/ or processed greatly influence learning outcomes. Moreover, most learning style advocates stress that stylistic preferences greatly influence how we learn, but do not limit what we are capable of learning (Dunn, 1987; McCarthy, 1988).

Dunn, Beaudry, and Klavas (1988) have recently completed a review of the literature on learning styles. The review covers research on environmental, sociological, affective, and physiological factors found to differentially affect individuals' academic performance. Please note that physiological factors are also referred to as cognitive styles or processing styles (Dunn and Griggs, 1988; McCarthy, 1988). We summarize the major findings for each factor as follows:

Research on environmental factors suggest that:

- (1) Only 10-20 percent of children in grades K-12 are strongly affected by their environmental learning style preference such as level of illumination, room temperature, and sound;
- (2) It is quite feasible to modify the traditional classroom to respond to the environmental preferences of children most affected;
- (3) When children with strong environmental stylistic preferences are taught and tested under environmental conditions congruent with their learning style, they display significant increases in their academic performance, attitude towards learning and classroom behavior.

Research on sociological factors suggest that:

- (1) When students are taught under conditions both congruent and incongruent with sociological preferences such as group versus individual; movement versus stationary; visual versus auditory they achieve more and like learning more when the conditions are matched with their stylistic preference;

- (2) Sociological factors were found to have a strong relationship with developmental stages such as younger children are found to be more tactile/kinesthetic and movement oriented, while peer orientation during adolescents seems to result in a higher preference for group learning during this developmental stage;
- (3) Sociological factors are found to have a strong affect on younger children's achievement, sometimes as many as 50 percent of the children are significantly affected by their sociological preferences as compared to the 10-20 percent strongly affected by their environmental preferences.

Research on affective factors suggest that:

- (1) Younger children learn better with structure than older children and low achievers seem to need more structure than high achievers;
- (2) Nonconformists do not learn effectively under conditions which require conformity.

Research on physiological factors suggest:

- (1) Hemispheric dominance, (i.e. left brain/right brain; analytic/global; inductive/deductive) has been found to greatly influence processing; however, regardless of whether a person is a left or right processor he or she is capable of learning identical information and skills with instruction that complements their hemispheric style;
- (2) Left and right brain people tend to show different environmental and sociological learning style preferences such as right brains prefer more group learning and dimmer illumination while left brains prefer more individual learning and brighter illumination;
- (3) Right brain students require less conventional learning contexts while left brain students do well in the traditional classroom setting.

These reviewers conclude that:

- (1) Most of the academic failure present in schools today can be accounted for by the incongruence between the contextual conditions of instruction and the stylistic preferences of the students;
- (2) There exist feasible methods for identifying individuals learning style preferences and for restructuring instruction contexts to accommodate such preferences;
- (3) Every person has a learning style and it is important to capitalize on such preferences because they can be used as learning strengths;
- (4) No style is better or worse than another. All styles have similar ranges with respect to potential for intellectual development;
- (5) Within any group, including ethnic, cultural, socioeconomic, classroom, and family there seems as many differences as there are between groups.

In another line of research, Chess, Thomas and Birch have identified several dimensions of affective style,

referred to as temperament. Their stylistic categories include: approach/withdrawal; quality of mood; intensity of reaction; activity level; adaptability; sensory threshold; distractibility; attention span and persistence. Although they make no claims to cultural or ethnic group differences in these categories of temperament, they do call attention to the relationship between dissonance with respect to the child's temperament and learning and socialization experiences. They argue that it is the problem of "goodness of fit" between the learner characteristics and learning conditions that requires greater attention in the school's response to differences in learning style.

In sum, it can be concluded that individual stylistic preferences exist and that modification of the learning context to complement learning style preferences can result in increased academic performance. Further, younger children have been found to be greatly affected by their preferences. This suggests that accommodating one's stylistic preference during the primary grades is important for building the foundation for later academic success. In addition, numerous within group learning style differences have been identified, thus implying that between group differences or group predilections are not as strong in learning situations as are individual preferences. However, this latter finding can be criticized for the type of preferences empirically scrutinized. Specifically, the research on learning styles sought to identify various characteristics of individuals which may have a significant effect on learning. Although much of this research grouped individuals by certain demographic similarities such as race, ethnicity, socioeconomic status, and gender, the research very seldom established a link between the preferences tested and the demographic groupings. Accordingly, one would not expect many group similarities given that the preferences under test were arbitrary to the group structures in question. Yet many researchers contend that when the behavior preferences under investigation are generated from the life experiences of the group, significant between group differences are obtained and that such differences can enhance academic outcomes (Tharp et. al., 1984; Howard and Scott, 1981; Gordon, 1983; Longstreet, 1978; Boykin and Allen, 1988).

Ethnic Group Differences in Learning Style

The literature on ethnic group differences in learning style is composed primarily of studies which seek to discern the difference between Euro-American's approaches to tasks and the approaches employed by other ethnic subpopulations in the United States. The major premise of these works is that minority groups often possess stylistic behaviors which are in direct opposition to the stylistic preferences of the majority group.

In a review of the literature on the stylistic preferences of African-Americans as compared to Euro-Americans, Shade (1982) employs the term cognitive style to refer to a superordinate construct designed to measure individual's preferences in various conceptual, perceptual and personality dimensions. Shade reports that considerable data exists to suggest that there are ethnic group differences in cognitive style preferences. For example, the bulk of the literature on perceptual styles empirically establishes that Euro-Americans prefer the field independent approach to problem solving, whereas African-Americans show a preference for the field dependent approach. Further, ethnic differences in cognitive style preference were also found with the construct of locus of control. Much of the literature in this area contends that African-American children tend to be less internal in their locus of control orientation than their Euro-American counterparts. Also, ethnic group differences in conceptual styles have been documented. Research shows that Euro-Americans tend to be more analytical and reflective in their conceptual orientation than African-American children.

Similar stylistic differences have been documented when various Latino groups are compared to Euro-Americans. Latino groups have been shown to be more external in their control orientation than Euro-Americans. Also Latino Americans have been found to be more field dependent than their Euro-American counterparts. In addition, data shows that Latinos tend to be less analytic than Euro-Americans (Anderson, 1988).

At the present time it is not known whether a relationship exists between the above stylistic preferences and the cultural orientation of the groups under study. However, such literature provides virtually the only data which empirically establishes stylistic preferences between culturally distinct groups. Yet this body of literature on ethnic group differences has been criticized in two major areas:

- (1) methodological and (2) philosophical.

With regards to the former, Curtis Banks and his associates (1989) have argued that the group preference literature does not successfully establish differences between ethnic groups. They maintain that the literature is impregnated with methodological problems, as well as problems with the interpretations of the data. The former criticism is fueled by the growing skepticism of the comparative paradigm employed to empirically establish such trends. It is maintained that such a paradigm is inherently designed to yield differences between groups and as such, its major usefulness is to establish degree of difference. In terms of the latter criticism, these authors found that in much of the data on control orientation conclusions were drawn which were inconsistent with the actual findings. Specifically, in reviewing the actual data it was found that the conclusions drawn were only accurate in relation to the reference population (Euro-Americans) but not in relation to where the subjects fell on the continuum of the construct. For example, the bulk of the actual data for African-American subjects reveal that they tend to be more neutral in their control orientation as opposed to the common notion that they are external in locus of control. The data only show that they tend to be more external than Euro-Americans. Thus, it is not known whether this construct is actually valid for measuring the control orientation of some populations, given that some groups do not display a definitive preference, only a preference which deviates from the Euro-American reference group. In personal discussions with Dr. Banks subsequent to reading the 1989 paper, he indicated other data which suggest similar criticisms of many of the other alleged style constructs including field independence/dependence and delay of gratification.

In turning to the philosophical criticisms of the ethnic group stylistic preference literature, one may begin to postulate a reason for the methodological flaws outlined by Banks et. al. (1989). In this instance, researchers such as Boykin (1983), Jones (1979) and Nobles (1976) assert that the trends established in the style literature may only indicate how successful certain cultural groups have been at mainstreaming themselves into the Euro-American society. Their arguments are based upon the assumption that the constructs investigated were essentially measures of the cultural/behavioral styles germane to the Euro-American cultural ethos. Hence, we see much of the same deviation from the Euro-American sample's stylistic preferences by various different ethnic groups. Thus, it is argued that the differences found in stylistic preferences are actually the extent to which different ethnic groups have been incompletely socialized into the mainstream aspect of their cultural reality. As an alternative, these researchers suggest that we begin to search the full parameters of the cultural reality of these ethnic subpopulations such that a better understanding of the experiences and styles most salient to their behavioral repertoire can be identified.

Culturally Specific Stylistic Behaviors

Recent years have witnessed empirical study of stylistic preferences generated specifically out of the ethnic experiences of subpopulations within the United States. As with the individual difference learning styles literature, these particular studies were generated as attempts to discern contextual factors which could be used to facilitate the academic performance of educationally at risk populations. Also, like the learning styles literature, the work on cultural styles makes the assumption that the conditions under which processing occurs will greatly influence the performance outcomes; yet such preferences do not limit what one is capable of learning.

In one example, Tharp and his associates (1984) sought to determine the extent to which aspects of the ethnic Hawaiian culture could be used to facilitate the academic performance of these children. In reviewing the culture of the American based school system and that of the ethnic Hawaiian community, they found many incongruences. For example, the school fostered adult-child interactions, while the ethnic culture fostered peer-peer interactions and the school foster individualism, while the ethnic culture fostered group behaviors. In this applied study, the researcher incorporated aspects such as these into the learning environment of ethnic Hawaiian children. Their longitudinal results show great increases in performance on various measures including math and reading aptitude. Thus, they conclude that changing the contextual conditions of the classroom environment to fit the prevalent culture of the children can facilitate academic performance.

Another example is offered by a program of research being conducted by Boykin and his associates on low income African-American children. In this instance the authors assert that the ethnic experience of contemporary African-Americans has its roots in the traditional African belief system and manifest itself for the most part in terms of Black cultural styles (Boykin, 1983). It is postulated that this ethnic experience takes on the distinct stylistic form due to the mental and physical separation of the African-American from the traditional African world view. Yet certain beliefs and values have been preserved and transformed tacitly in the early socialization experiences of Black people. Hence, Black cultural styles are a result of cultural conditioning and as such, are basically habitual patterns of behavior. Several "Black cultural" styles such as spirituality, movement expressiveness, and an especial receptiveness to variability and intensity of sensate stimulation have been identified by recent authors (Boykin, 1983; Young, 1974; Hale, 1982; Morgan, 1980; Gay, 1975).

In their empirical work, Boykin and his associates (Boykin, 1979; 1982; Tuck, 1985; Boykin and Allen, 1987; Allen and Boykin, 1988) have sought to discern whether or the especial receptiveness to high levels of variability and intensity of stimulation and movement or a rhythmic movement music and percussive orientation could be capitalized upon to increase the task performance of low income Black children. Their results demonstrate that Black children's performance can be facilitated by the affordance of high levels of movement and/or sensate stimulation in learning context. Moreover, this performance facilitation has been found to relate to the amount of movement and sensate stimulation fostered by these children's home environment. Still further no such connection has been obtained for any other ethnic group-socioeconomic combination such as middle class African-Americans or low and middle class Euro-Americans. These authors conclude in their works that performance facilitation can be obtained for low income African-American children if cultural factors are considered in task contexts.

Other examples of contextually induced performance enhancement for African-Americans have been obtained. For instance, the use of Black English Vernacular, ethnic Black conversational styles and culturally relevant instructional materials has been found to enhance low income Black children's reading performance (Hall, Reader and Cole, 1979; Plestrup, 1973). Thus, this appears a fruitful area of study.

The use of ethnic groups' indigenous language structures as a foundation from which to enhance their use of Standard English has also received empirical attention. Many linguist (Zentella, 1988; Heath, 1983; Smitherman, 1977) note that the way to achieve oral and literate excellence in Standard English is to recognize and accept the rule-governed, grammatical nature of any non standard dialect. It is maintained that through the use of the familiar language of the ethnic subpopulation one can begin to build upon and expand the linguistic repertoire of the student. A case in point is the work by Heath (1983). In this study, she examines the effects of the preschool home and community context on group-specific ways of learning those language structures and uses which are needed in schools and work settings. The author documents the negative consequences associated with school policy which fails to incorporate culturally specific ways of learning. She concludes by arguing for the contextualization of academic learning for all students, building upon their unique cultural experiences in the academic curriculum.

Another aspect of ethnic subpopulations' cultural worlds which has received empirical attention is the stylistic behaviors fostered by their minority experience. While many would not agree that the minority experience consists of a true cultural process, consensus for the notion that behavioral tendencies are generated by this experience does exist (Ogbu, 1978; Harrell, 1979). The range of the work in this area spans the universal minority position guided by the theory of "Culture of Poverty" (Lewis, 1966) to the notion of the economically disadvantaged (Wilson, 1987) on to the more recent socio-structural analyses offered by Ogbu (1977; 1981). While there are great differences in the philosophical positions taken in these works, a major conclusion drawn from all seems to be that the consequences of limited access to the political, economic and social structures of this society manifests itself in certain stylistic behaviors which affect learning behavior and school performance. For example, Fordham and Ogbu (1986) found that African-American youths tend to view the behaviors fostered by the school experience with disdain primarily because these children see the educational system as a means for society to negate their existence in return for a monolithic behavioral repertoire. These beliefs are confounded by a realization by such children that the system affords them limited access to the rewards offered by society even if they portray the "appropriate" behavioral repertoire.

From such beliefs, the authors observed a certain common notion among these children that academic success is tantamount to "acting white" and accordingly, they tend to display styles which seek to disassociate them from such a label. The outcome appears to be lower academic performance than these children's ability levels indicate or in many cases total academic failure.

From the extant body of knowledge reflected in the research literature, we can conclude that stylistic preferences in learning behavior do exist and that some of these preferences adhere to cultural and ethnic group identity. We also see that the use of these behaviors, as well as divergence from them are not only influenced by habit; but also by certain beliefs held concerning the nature of the society and its reward system. There is some evidence and considerable professional intuitive support for the idea that the incorporation of sensitivity to behavioral style preference into the teaching and learning transactions has potential for enhancing academic achievement.

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G. POSITION PAPERS

Behavioral Style, Culture, and Teaching and Learning

A Position Paper Presented to

The New York State Department of Education

By

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March, 1988

In 1976, I wrote a technical report on work that I had done for the California State Department of Education. It was entitled, Alternatives To I.O. Testing. An Approach To The Identification of Gifted "Minority" Children. One aspect of that work involved taking a close look at the matter of behavioral style, which included but was broader than cognitive style. I was exploring the idea then that behavioral style might help to explain the gap in test performance between white and black students, or between any two groups of students, for that matter. The assumption was that two groups of students that actually had the same intellectual potential would, because of diversity in cultural socialization, develop habits and preferences that would cause them to manifest their mental power in somewhat different ways.

The research that I was doing at that time was focused on testing and assessment issues. It did not focus directly on the matter of the use of testing and assessment data for the design of instruction in settings that could be characterized as culturally diverse. However, I fully expected then just as I do now that diversity in behavioral style, which also is correlated to group behavior among cultural groups, would be a meaningful phenomenon to be taken into account in the delivery of instruction. Naturally, the utility of behavioral style for instructional planning is dependent upon systematic study of its nature and its potential.

Since 1976, I have pursued other research interests, at least one of which was a part of the 1976 study. That area of interest is African and African American History and Culture. In addition, I have also studied effective instructional strategies. While, behavior style including cognitive style, remains an area of interest to me, it has not been my priority area of research. However, I have kept up fairly well with some of the best literature in the area.

In 1976 and since that time abundant and overwhelming data have accumulated in a variety of academic disciplines to show that behavioral styles exist among individuals. In addition, abundant and overwhelming data exist to show that cultural groups vary with respect to style. The academic disciplines that contain the evidence include anthropology, psychology, linguistics, and other disciplines. A selected bibliography is included here.

My research focused on African and African American culture in contrast to European and European American culture. As indicated in my technical report, I could have selected any one or more dimensions of human experience for closer study. I chose to review the literature that would allow for a comparison between African American and European Americans in the following areas.

1. Religion
2. Language
3. Music

My study was undertaken in full recognition of the clear fact that precise attribution of cultural identity to individuals is certain to be fraught with error. I wrote rather of tendencies within groups. As I indicated, an individual may be very much like most of the members of his or her historical group of reference. Or, he or she may operate in a way that is quite outside his or her historical group of reference. All of this is dependent upon cultural socialization.

I hasten to add, that I refer to culture, rather than to race, or to class, even though there may be some correlation among all three variables because of political and economic realities. For example, African Americans have for years been segregated and confined in general to a common space and to common economic conditions, resulting in a high degree of in group socialization.

I found in 1976, and I have seen nothing since that time to challenge that finding, that a unique African American culture could be described empirically, and that most African Americans shared in this core culture to a greater or lesser degree. It has been interesting that some European American and some African American commentators seem to be threatened by the very idea that an African American culture exists. Some even deny that African Americans have a culture, only a "Culture of Poverty." Clearly such a position could only be taken by someone who has not studied this matter systematically. Advertisers in the private business sector are well aware of cultural diversity. Without such awareness they would fail miserably in many markets. Since there are few if any penalties in education, such as profit loss, we have had the luxury of ignoring meaningful phenomena.

It is one thing to determine that behavioral style exists and that cultural style also exists. It is quite another thing to make valid pedagogical applications of the information. In fact, it could be the case that style could exist (behavioral style, cultural style, learning style) and that there might be no meaningful implications for instruction. On the other hand, an understanding of style may very well help us to solve some of the stubborn pedagogical problems that exist today.

In 1976, I wrote the following comments at the end of my paper under a section entitled Cautions And Interpretation.

"It is critically important that those who use the information presented here be aware of the following points:

1. We do not regard style as in any way equivalent to IQ or "intelligence." We simply regard style as the vehicle through which intelligence is expressed.
2. We do not posit the notion of style as an excuse to explain why some children do not learn in some subjects. In fact, we believe that there is evidence to indicate that any content may be learned by any style user. The question is simply one of how a given style user will approach the task and whether the approach that a given style user uses is compatible with that of the teacher or the institution which provides instruction.
3. Finally, it is our opinion that the evidence indicates that style is. However, there is no intent here to take sides in any debate over whether style should or should not exist. That would be a separate discussion and would be resolved in terms of the aims of society and education.

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But what are we to do with the information about style in the instructional process. I believe that it is useful to think of the possible response as falling into two general categories. First there are responses about which we may feel a reasonable degree of certainty. Then there are responses about which we may feel less certain, where more information is needed.

CLEAR PEDAGOGICAL CONSEQUENCES It is my opinion that there are three clear problem areas which can be informed by what we know now about style. They are as follows:

1. The misunderstanding of cultural behavioral style leads to errors in the estimation of a student's or a cultural group's intellectual potential. The consequences of such errors are enormous. This leads to mis-labeling, mis-placement, and mis-treatment of children.
2. The misunderstanding of cultural behavioral style leads to errors in estimates of learned abilities or achievement in academic subjects such as reading. For example, it has been shown that some teachers who are unfamiliar with the story telling style of African American children are actually unable to follow the children's story, failing to detect the inherent order of the story, even to the extent of believing that the children's orderly stories have no order at all.
3. The misunderstanding of cultural behavioral style leads to errors in the estimate of the language abilities of the students.

In general, the literature on teacher expectations is clear. The images that teachers and others hold about children and their potential have a major influence on the use by the teacher of the teacher's full range of professional skills. For example, if a teacher believes that a student's intellectual potential is low, research shows that the teacher will "teach down" to the estimated level. They will simplify, concretize, fragment, and slow the pace of instruction. They will fail to offer abstract conceptually oriented instruction to the child. So we see that it is not the learning style of the child that prevents the child from learning. It is the use of the style by the teacher as a sign to reduce the quality of instruction offered.

Students can master any style of instruction, provided that they are given the opportunity to develop the new repertoire. In my experience, expanding the students repertoire can be accomplished in a reasonably brief period of time. Styles are more like habits, values, and preferences than they are like biological dispositions. Students have an incredible capacity for developing multiple styles in much the same way that multiple language competency can be accomplished.

POTENTIAL PEDAGOGICAL CONSEQUENCES The issue associated with cultural behavioral style is not at all a matter of students capacity to accommodate to the style of the school. I have shown in my 1976 technical report that the traditional American school is quite rigid and encapsulated in a particular style. Mainly, the traditional school operates in mimicry of the cultural style of European Americans. Yet this is not the only way to teach.

What is even more important, it may not even be the best way to teach for European American children. The real question is what is the pedagogical value to all children and teachers of providing stylistic diversity in the schools.

Unfortunately, we tend to treat the stylistic mismatch between some students and the schools as a student deficiency or problem requiring the students to change. We fail to see the potential for enriching the school experience for all children. Moreover, we fail to see that the traditional school style has severe limitations. Business and industry leaders are well aware of the fact that it takes a great deal more than our stale conforming educational process to produce the flexible and creative risk takers that they often require. Many millions of dollars are spent in large corporations today trying to expand the stylistic repertoire of rigid sales people, managers, researchers, and supervisors.

The justification for doing something about style in teaching is therefore not merely a question of equity for poorly served groups. The diverse cultural groups that make up the school population are a rich resource. They have much to teach the schools that are dominated by the handcuffs of traditional practice about which we have done too little reflection.

SUMMARY AND CONCLUSION

We can be certain that behavioral cultural style variations in the schools will create the potential for significant problems in communication between teachers and some of the children they serve. These communication problems are likely to be most acute when it comes to standard approaches to testing and assessment and the interpretation that is made of results. The communication problem may also be manifest in other parts of the teacher student interaction. For example, the ability of a teacher to establish rapport and to establish the desired teacher/learner bond can be affected by the way that the incongruent styles are managed. At present, we have much more data on style and assessment than we do about style and communication in education. Anthropologists have gone much farther than educators in developing an understanding of the meaning of style in human communications. For example, see Edward T. Hall's book, Beyond Culture, and Kochman's Black White Styles In Conflict, among others. So once again, it is less a matter of style influencing learning than it is that style influences teaching.

Perhaps the most significant thing about the discussion of styles and learning is that it provides the opportunity to raise issues pertaining to pedagogy that would not be raised otherwise. If African American and Hispanic children were not performing at too low a level, we might be tempted to leave the school situation as it is, believing it to be adequate for the European American students who seem to be doing well. Yet a look at the

workplace and at the general way that many Americans tend to live their lives suggests that there is cause for deep concern. In my 1976 technical report, I contrasted the characteristics of schools as they appear to be in the majority of cases today with some alternative characteristics. Over the years, many educators have had occasion to examine the two lists of characteristics side by side. Almost without fail, there is a tendency for educators to verbalize a preference for school systems to operate on the basis of more flexible, creative, improvisational, spontaneous and less rigid principles. In fact, the list of potential characteristics for schools is usually associated with the image that most educators hold about the operation of gifted programs. In interviews, educators tend to favor personal professional behaviors that are like the second "as it could be" list to the "as it is" list. Clearly, if for no other reason than that the image of the school that teachers and school leaders want is different from the schools that we have, we can use the current situation in New York as a springboard for a far reaching reform. Such a reform can serve the needs of poorly served cultural groups. The fringe benefit is as usual that anything that benefits the poorly served students always to the benefit of all.

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LEARNING STYLES DIALOGUE---APRIL, 1988

THE BOARD OF REGENTS OF THE UNIVERSITY OF THE STATE OF NEW YORK

by

Bernice McCarthy and Marcus Lieberman

This convocation of scholars, researchers and educators concerns stereotypes, their insidious influence in the human community, and the manner in which they may and do prevent children from equal access to learning. It ranges far beyond the glib superficiality of a Jimmy The Greek, or Al Campanis, into the most intimate recesses of each teacher's and student's heart, into the hidden agendas of much testing, curriculum planning and homogeneous grouping of students, into the limited and crippled goals many learn to set for themselves and which ultimately become cruel, self-fulfilling, self-mocking prophecies. Stereotypes wreak havoc--personally, culturally, historically. Whatever the motivation, separate is never equal.

Excel is a network of professional educators committed to the recognition and celebration of differences in learning. It has never been nor will ever be an agency which fosters or sanctions stereotyping of learners in any way. Some people insist on confusing the recognition of differences with stereotyping. Such a confusion boils all flavor and spice from the human melting pot. Courageous emphasis on differences and the sharing of differences, however, offers all learners tastier, better balanced nourishment. While it continues to conduct field research into any possible connections between genetic, sexual, ethnic, racial, economic, or other factors and a person's preferred learning style, the true significance of Excel's 4MAT¹ design requires that each learner experience all ways of learning.

Based on Excel's eight years of work in school systems throughout the United States and Canada, this paper puts forward two major premises.

1. Students have major learning styles differences.
2. Designing and using multiple instructional strategies to teach to these styles can improve teaching and learning.

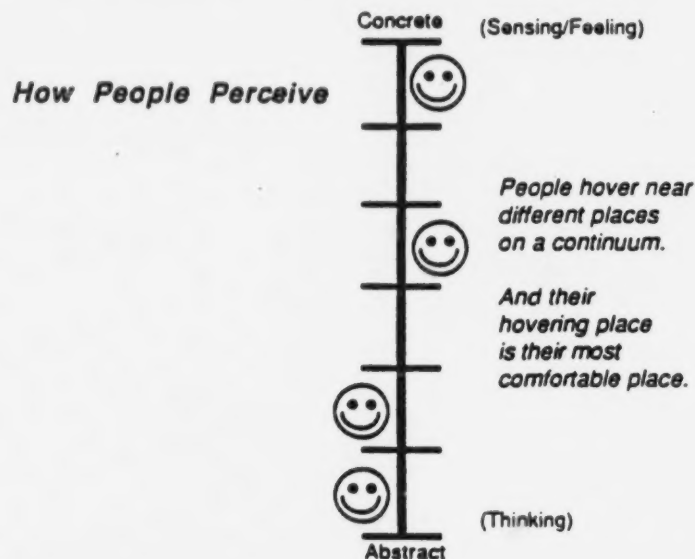
1. Students have major learning styles differences.

Learning Styles are approaches to learning developed by individuals over time.

Differences in learning styles depend on many things: who people are, where they are, how they see themselves, what they pay attention to, and what people ask and expect of them. As they each react to the experience and information encountered, they develop and adapt abilities that tend to emphasize some orientations over others. Such adaptations or possibility-processing structures form the personal bases of learning.

According to David Kolb², whose research forms the basis for the learning style theory presented here, there are two major differences in how people learn. The first is how they perceive, the second is how they process.

People perceive reality differently. They take things in in different ways. In new situations, some people's primary response is to sense and feel their way, while others think things through. No one uses one response to the total exclusion of the other. However, in their reactions, people hover near different places on a continuum, and that hovering place is their most comfortable place.



Those who perceive in a sensing/feeling way project themselves into the experience/information. Meaning shines through the lens of personhood. They tend more to the actual experience itself. They immerse themselves in the concrete reality. They perceive through their senses. They intuit. And because of the very nature of personhood and intuition, the process is essentially holistic.

On the other hand, those who think through experiences tend more to the abstract dimensions of reality. They analyze what is happening. Their intellect makes the first appraisal. They reason experience. They approach experiences logically.

Whereas the feeling mode is connected knowing, the thinking mode is separate knowing. Feeling implies embeddedness, whereas the thinking mode necessitates a kind of standing outside, an attempt to subtract the personality of the perceiver.

While demonstrably different from each other, both kinds of perception complement rather than exclude the other. Both are equally valuable. Both have strengths and weaknesses. Most important of all, every learner needs both for the fullest possible entry into new experience.

Perception alone, however, does not equal learning. The particular perceiving orientation one favors over time, the feeling or the thinking, forms one of two major determinants of personal learning style. In order for learning to happen, perception must be followed by processing.

The second major difference in how people learn is how they process experience and information, how they make it part of themselves.

Some people jump
right in and try it.

Others watch
what's happening,
reflect on it.



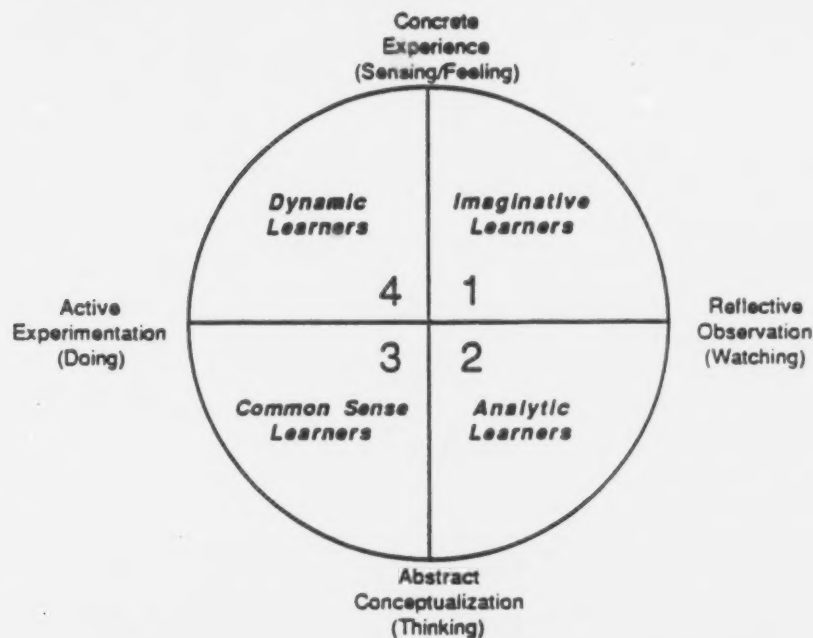
Some people are watchers first, others are doers first. Both ways of processing information and experience are equally valuable and both have their own strengths and weaknesses. The watchers reflect on new things. They filter them through their own experience to create meaning connections in a slow, deliberate choosing of perspectives. The doers act on new information immediately. They reflect only after they have tried it out. They need to do it, to extend themselves into the world, in order to make it theirs.

The processing dimension is a continuum that ranges from the need to internalize to the need to act, from the specific personal fit, to manipulation and usefulness in the larger world. Watchers need to refine their reflective gifts while also developing the courage to experiment and try. And doers need to refine their experimenting gifts, while also developing the patience to watch reflectively.

Both kinds of perceiving, the concrete and the abstract, and both kinds of processing, the reflective and the active, are equally valuable. To allow and encourage students to move across both is to encourage excellence. The particular way people perceive and process is the best way for them, their most comfortable place. It is the stepping-off place from which they move toward wholeness. It is their favored place in the sequence of knowing. These differences are not higher or lower levels of knowing. They are just different. These differences are not negative; they are not deficits. Quite the opposite, they offer opportunities for growth.

Learning Style Characteristics

David Kolb, following the work of Kurt Lewin, Jean Piaget and John Dewey, took these two dimensions of perceiving and processing, and juxtaposed them to form a four-quadrant model. The result of this structure was the delineation of the boundaries for four major learning styles.



David Kolb's research represented a breakthrough because it formulated learning style findings into model form. But Kolb's contributions did not end with the model. He went on to analyze the different types of learners. He notes that our dominant learning abilities are the "result of our hereditary equipment, our particular past life experiences, and the demands of our present environment."³

The findings of other learning style researchers are strikingly similar.⁴ In fields ranging from psychology to management training, researchers have made nearly the same discoveries. Though they worked separately, with different techniques, in different areas, they came up with almost perfectly parallel learning schemes. One way to see how similar they are is to summarize their findings by overlaying them on the model developed by Kolb. A set of descriptors for each learning style emerges.

Type One: Imaginative Learners

They perceive information concretely and process it reflectively.

They integrate experience with the self. They learn by listening and sharing ideas. They are imaginative thinkers who believe in their own experience. They excel in viewing direct experience from many perspectives. They value insight thinking. They work for harmony. They need to be personally involved. They seek commitment. They are interested in people and culture. They are thoughtful and enjoy observing others. They absorb reality. Sometimes, because they see all sides, they have difficulty making decisions. They seek meaning and clarity.

Type Two: Analytic Learners

They perceive information abstractly and process it reflectively.

They devise theories by integrating their observations into what is known. They seek continuity. They need to know what the experts think. They learn by thinking through ideas. They form reality. They value sequential thinking. They need details. They critique information and collect data. They are thorough and industrious. They will reexamine the facts if situations perplex them. They enjoy traditional classrooms. They find ideas fascinating. They prefer to maximize certainty and are uncomfortable with subjective judgments. Sometimes they seem cool and aloof. They seek intellectual competence and personal effectiveness.

Type Three: Common Sense Learners

They perceive information abstractly and process it actively.

They integrate theory and practice. They learn by testing theories and applying common sense. They are pragmatists. They believe if something works, use it. They are down-to-earth problem-solvers who resent being given answers. They do not stand on ceremony but get right to the point. They have a limited tolerance for fuzzy ideas. They value strategic thinking. They are skills oriented. They experiment and tinker with things. They need to know how things work. They edit reality, cut right to the heart of things.

Type Four: Dynamic Learners

They perceive information concretely and process it actively.

They integrate experience and application. They learn by trial and error. They are believers in self-discovery. They are enthusiastic about new things. They are adaptable, even relish change. They excel when flexibility is needed. They often reach accurate conclusions in the absence of logical justification. They are risk takers who are at ease with people. They enrich reality by taking what is and adding something of themselves to it. They are sometimes seen as manipulative and pushy. They seek to influence.

Brain Hemisphere Dominance and Learning Styles

Brain hemisphere research further expands the consideration of learning styles. Current research on right and left brain functions began with Dr. Roger Sperry's⁵ animal studies during the 1950s and continued with similar operations on human patients in the 1960s.

Major findings of this ongoing study were:

1. The two halves of the brain, right and left hemispheres, process information differently.
2. Humans are a two-brained species, each having its own special mind.
3. Both hemispheres are equally important.

Dr. Joseph Bogen⁶, neurosurgeon and collaborator of Dr. Sperry, suggests that individuals rely more on one information processing mode than the other, especially when they approach new learning. Research typically describes the left mode as serial, analytic, rational and verbal. The right mode is described as global, visual and holistic, able to see patterns and connections.

Left Mode

Rational

Responds to verbal instructions

Likes controlled, systematic experiments

Prefers established, certain information

Objective

Looks at differences

Analyzes

Exhibits primary reliance on language
in thinking and remembering

Prefers objective tests

Sees cause and effect

Controls feelings

Prefers hierarchical authority

Excels in propositional language

Sees design details

Digitalized

Formal laws

Superior in:

Writing

Digit and letter recognition

Nameable shapes

Word recognition and recall

Phonics discriminations

Serial, analytic difference detection

Right Mode

Intuitive

Responds to demonstrated instructions

Likes open-ended, random experiments

Prefers elusive, uncertain information

Subjective

Looks at similarities

Synthesizes

Exhibits primary reliance on images in
remembering

Prefers essay tests

Sees correspondences

Is free with feelings

Prefers collegial authority

Excels in poetic, metaphoric language

Sees overall design form

Patterned

Paradigms--shared theories

Superior in:

Drawing

Verbal material when imagery is used
to code

Nonverbal dimensions: light, hue,
depth

Photographs, schematic figures

Tactile discriminations

Rapid, global, identity matching

People who approach learning with a left-mode processing preference have beautiful gifts. They are systematic, they solve problems by looking at the parts, they are sequential and are excellent planners. They are analytic.

People who approach learning with a right-mode processing preference have beautiful gifts. They see patterns, they solve problems by looking at the whole picture. They are random and arrive at accurate conclusions in the absence of logical justification. They are intuitive. People who access their whole brain flex and flow. They have both sets of beautiful gifts.

Several studies have been done to determine students' learning style preferences, brain hemisphere dominance, and what relationship exists between learning styles and right-, left-, and wholebrained processing preferences. (See Addendum.) Among the important conclusions that emerged were:

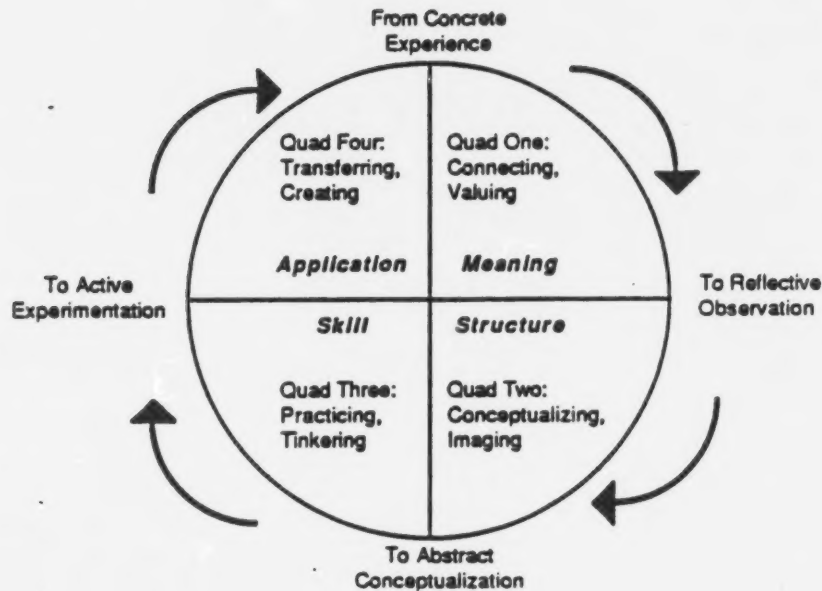
1. Approximately equal percentages of boys and girls fall into each of the four learning style groups.
2. During formal schooling years, students tend to favor the concrete experience dimension over the abstract dimension.
3. More students were right-mode dominant than left-mode dominant.
4. Each of the four learning style quadrants had right-mode, left-mode, and wholebrained students.
5. These brain dominance characteristics are related to sex in some as yet undetermined way.
6. These brain dominance characteristics are related to age and educational experience in some complex interaction with the dimensions of concreteness and abstractness in some as yet undetermined way.
7. There is a strong tendency toward left-mode in quadrants two and three and a strong tendency toward right-mode in quadrants one and four. So the relationship between the concrete and the right mode and the abstract and the left mode is a strong one.

If it is true, as research conclusively shows, that students have major learning style differences, then it is almost tautological to state that these learning styles have important ramifications for instructional strategies. It is to that second premise that this paper now turns.

2. Designing and using diverse instructional strategies to teach to learning styles can improve both teaching and learning.

While the scientific identification of styles and their complex causes is important, educators do not need to wait for refined knowledge to act. They can improve pedagogy by using diverse strategies in a cycle of learning. This cycle needs to appeal to each student's most comfortable style in turn, while stretching them to function in less comfortable modes.

Kolb's model is important not only because it creates parameters that classify styles, but also because it presents a cycle of learning. The movement is from experience, to reflection, to conceptualization, to experimentation.



Then the cycle begins again, with new richer experiences in ever-widening spirals. In this way, all students, whatever their learning styles, get a chance to shine 25% of the time. That has not been possible in most schools in the past. It is still not possible in many schools today.

Schools primarily teach in Quadrants Two and Three and in the left mode, giving information to passive receivers and requiring the completion of workbooks and questions at the ends of chapters in order to get to the next chapter. This, of course, is inadequate instruction. Students need the completeness of all four quadrants progressing from

experience

to reflection

to conceptualization

to experimentation,

using both modes of information processing,
right and left,
in a movement

from "in here" to "out there",
from subjective to objective,
from synthesis to analysis
and back again.

Students need to go through the complete cycle.

This movement around the circle is a natural learning progression.
 Humans sense and feel, they experience,
 then they watch, they reflect,
 then they think, they develop theories,
 then they try out theories, they experiment.

Finally, they apply what they have learned to the next similar experience. They get smarter. They apply experience to experience.

Each of the learning style types has a quadrant where s/he is most comfortable, where success comes easily. The Imaginative Learners, those who fall in Quadrant One, prefer to learn by sensing/feeling and watching. The Analytic Learners, those who fall in Quadrant Two, prefer to learn by thinking and watching. The Common Sense Learners, those who fall in Quadrant Three, prefer to learn by thinking and doing. And the Dynamic Learners, those who fall in Quadrant Four, prefer to learn by sensing/feeling and doing. All of the learners need all of the cycle. The cycle is more important than any one segment.

Percentages in the research already cited indicate there are right, left, and wholebrain learners in each of the four learning style quadrants. So the decision to create teaching strategies where left and right mode techniques are alternated through a four learning style cycle seems to be a common sense approach to teaching. If all four learning styles are taught to all students in a cycle that alternates from right to left mode information processing, and if in the doing, all styles are equally valued, this integration will allow students to be comfortable some of the time and stretched and challenged some of the time. Assume we could determine accurately the brain dominance of particular students as strongly right mode: these students need a concrete, intuitive, gestalt approach to learning.

It is necessary to allow such students to learn through the medium of their natural gifts. However, they also need to develop the abilities to abstract, to intellectualize, to break down and classify and to use sequential logic. To do less for such students is to deny their potential.

Educators can use the available instruments as tools. They can identify strengths and weaknesses with wisdom. But foremost in the search for answering individual differences in students must be to find strategies that encompass the wonderful complexity students represent. The emphasis should be on valuing the differences.

One Example of a Model: The 4MAT System

Based on the conviction that schools need to enhance wholebrained thinking, tasks and strategies were devised to call forth what it is believed are strong left- and right-mode responses. This requirement, to alternate between analysis and synthesis, was superimposed on the four learning style methodologies. The result is The 4MAT System.

4MAT is an attempt to help teachers and trainers design instruction and create strategies that appeal to all four learning styles, thereby requiring of students that they become more effective in alternate ways of learning, as well as functioning in their favorite style. The resulting cycle is a powerful teaching tool. It moves from meaning and motivation to conceptual understanding, then to problem-solving and skills, and lastly to the creative use of the material learned. It requires much, much more than facts recall. It requires that learners connect content to their own lives, understand the structural connections of the material, use what they learn in real situations, and design individual unique applications.

Learning styles are profoundly different, and educators need to honor and celebrate these differences. But the real meaning of learning style theory lies in the process required to move all learners through a cycle of learning, a cycle that encompasses all four styles, while still honoring and developing the uniqueness of each style. Learning style technology can lead us to use values as well as facts. It can stimulate us to reflect on the world and find its meaning, and also require us to act on the world and ascertain its relevance.

While many teachers have shared classroom success stories with 4MAT staff, the growing numbers of anecdotal reports are not sufficient to demonstrate the impact of the 4MAT system on students, teachers, and administrators.

Before attending to student outcomes, however, it is necessary to be sure that 4MAT is actually taking place in the classroom. The training program offered by 4MAT Associates includes awareness, intermediate and advanced workshops, along with continuous assistance in writing lesson plans and understanding the system.

Instruments have been designed to measure attitudes about teaching and learning and knowledge of learning styles and hemisphericity. These instruments possess traditional psychometric properties of reliability and validity, as demonstrated by previous studies. The measures are given early in the implementation and again late in the academic year. An early and late lesson plan are also submitted for rating. Finally, teachers complete field test reaction sheets, allowing them to document the teaching of their 4MAT lessons along with their perceptions of the strengths and weaknesses of the 4MAT system.

At this time, studies on teacher change have been conducted in Boston⁷ and Taunton⁸, Massachusetts and Fairfax County, Virginia⁹. In each case, teachers showed statistically significant growth in understanding 4MAT principles, having attitudes consistent with 4MAT assumptions, and skill in writing lesson plans. In addition, their experiences piloting a 4MAT lesson and their perception of the strengths and weaknesses of 4MAT have aided in the improvement of training strategies for increased utility, clarity and comprehensiveness. A fourth study is presently underway in Honolulu, Hawaii¹⁰.

An early study on student outcomes was conducted in Kirkwood, Missouri¹¹, where two of five 4MAT classes outperformed matched control classes teaching to the same objectives, but primarily using reading and discussion. The difference was statistically significant in only one of the two, and none of the other differences were significant. However, the pre- and posttests used were developed without close attention to representing the four learning styles and two hemispheric modalities. The classes were in Social Studies, Language Arts, Mathematics and Science.

In 1987, a study was conducted in North Carolina¹², with third grade, urban, racially mixed students randomly assigned to experimental (4MAT) and control groups. Outcomes included achievement, attitudes and interest. Both a posttest, administered immediately after a science unit on simple machines and another given 35 days later, showed significant differences favoring the 4MAT students. The researcher prepared the 4MAT lesson plans and the control teachers used procedures outlined in the teacher's guide accompanying their textbook. In summary, this study employed several forms of control employed in laboratory experiments, including randomized assignment to groups and standardized procedures, and found results showing the effectiveness of 4MAT.

Now that significant positive effects of 4MAT have been found in a tightly controlled experimental study, it remains to determine the magnitude of effects in a more field-oriented situation. In Fairfax County, Virginia, a second phase of implementation is presently in place. Twelve sixth grade teachers, six 4MAT and six control, are teaching a unit on geometry with agreed upon objectives. Each teacher designed a lesson plan to achieve the goals, and the 4MAT lessons were reviewed for fidelity to the model by 4MAT Associates. Students were pretested before the unit, posttested immediately after the unit and retested one month later to measure retention. 4MAT students also were asked to comment on their experience during the unit. Results will be available in early May.

This early and admittedly sketchy research as well as any glimpse of educational practice today indicates that learning styles are here to stay. If educators are to serve all students they must turn to serious study of them, focusing on how they learn as well as what they learn. Educators need to know how different students are, regardless of age, sex, race, or economic background, and how these differences affect the odds for success.

Learning styles theory teaches that while people are each unique, they yet have much in common, and that while they live within the world, they also may transform it. It is the cycle suggested by learning styles to which educators must turn. It is the instruction to be designed that holds the key. While it is most useful to examine the individual learner in order to understand the whole learning enterprise, great care must be taken not to make students objects in this endeavor. This could easily be done by embracing narrow definitions and prescriptive structures that do not move, grow and evolve. On the other hand, educators must not flinch from the task of identifying and refining descriptions that can lead to greater understanding, understandings concerning the strength of diversity and the image of wholeness this diversity offers. Educators need to examine their narrow notions of intelligence. They need to use learning styles to help students see the beauty of their own uniqueness, to appreciate the styles of others, and to accept the discomfort born of resolving the dialectics. Only then can they become their own transforming agents, only then can they become the subjects of their own lives.

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 6. Bogen, Joseph E., "Some Educational Aspects of Hemispheric Specialization", *UCLA Educator*, 17 (1975): 24-32.
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13. Torrance, Paul and Bernice McCarthy, *Your Style of Thinking and Learning-Form C*. Georgia Studies of Creative Behavior. Athens, Ga. 1977.
 14. Kolb *Learning Style Inventory*, Boston, MA, McBer and Co., 1981, 1985.
 15. McCarthy, Bernice, *The Hemispheric Mode Indicator*. Barrington, Illinois: Excel, Inc., 1986.

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Addendum

Distribution of Learning Styles in 329 Suburban Chicago High School Students

In order to determine what relationship, if any, existed between learning style and brain dominance, Paul Torrance's test *Your Style of Thinking and Learning-Form C*¹³ was used to test for hemispheric specialization, and Kolb's *Learning Style Inventory*¹⁴ to test for learning styles. Both instruments were administered in 1978 to 329 high school students, ages 17-18, 183 Girls and 146 boys. The students were from two suburban Chicago high schools.

Learning Styles Girls N = 183

Brain Dominance		One	Two	Three	Four	TOTALS
	Right	24	16	16	23	79 (43%)
	Left	11	11	7	14	43 (23%)
	Wholebrain	24	15	12	10	61 (33%)
	TOTALS	59 (32%)	42 (23%)	35 (19%)	47 (25%)	183 (100%)

Learning Styles Boys N = 146

Brain Dominance		One	Two	Three	Four	TOTALS
	Right	35	8	11	20	74 (50%)
	Left	12	18	7	13	50 (34%)
	Wholebrain	9	3	6	4	22 (15%)
	TOTALS	56 (38%)	29 (20%)	24 (16%)	37 (25%)	146 (100%)

Learning Styles Boys and Girls N = 329

Brain Dominance		One	Two	Three	Four	TOTALS
	Right	59	24	27	43	153 (46%)
	Left	23	29	14	27	93 (28%)
	Wholebrain	33	18	18	14	83 (25%)
	TOTALS	115 (35%)	71 (22%)	59 (18%)	84 (25%)	329 (100%)

TABLE I.

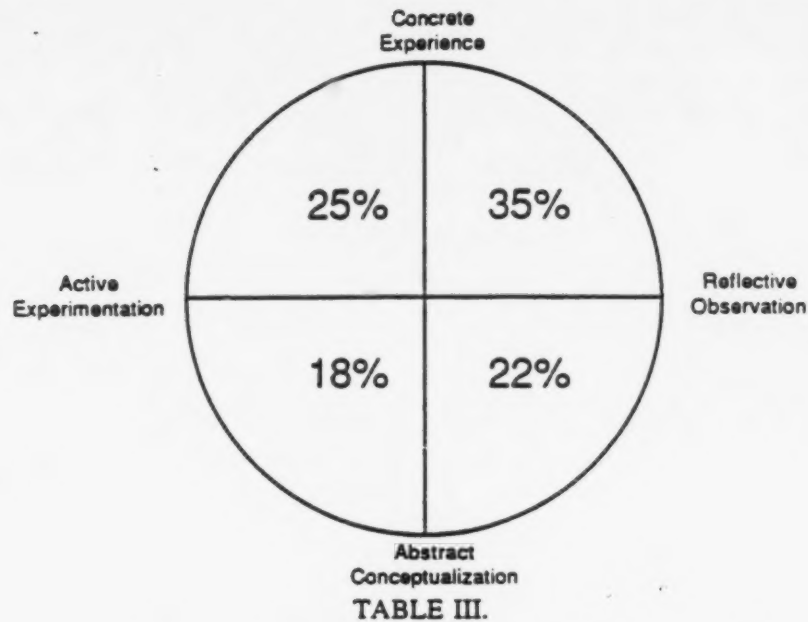
According to this student sample:

1. Approximately equal percentages of boys and girls fall into each of the four learning style groups.

	One	Two	Three	Four
Boys	38%	20%	16%	25%
Girls	32%	23%	19%	25%

TABLE II.

2. At this age, students tend to favor the Concrete Experience dimension.

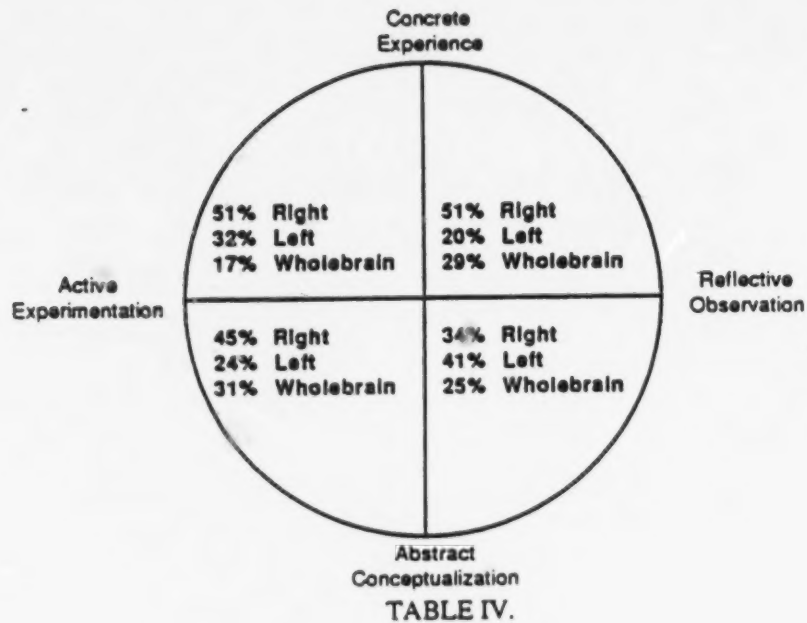


60% of the sample falls into quadrants one and four, and 40% of the sample falls into quadrants two and three, the Abstract Conceptualization dimension. Kolb has found a relationship between the amount of education and the level of abstraction.

3. Students seem to divide more evenly between Reflective and Active than they do between Concrete and Abstract with 57% Reflective and 43% Active. Somewhat more than half of this sample learns best by watching and the remaining by doing. This appears to conflict with Kolb's findings. He has reported a more active orientation in age group 16-39 and then a tapering off toward a more reflective orientation in later years.

4. More students were right-mode dominant than left-mode dominant. There were 46% right-mode, 28% left-mode, and 25% wholebrained. These percentages are not surprising given that students fall into concrete, rather than abstract learning styles. They are particularly noteworthy in that our schools are designed to instruct primarily in the left mode.

5. Each of the four learning styles quadrants has members of all three types of brain dominance.



6. Only the Analytic Learners (the two quadrant) have a higher percentage of left brain dominant members than any other type of brain dominance.
7. The percentages of students in each quadrant who tested as wholebrained indicate that the Type One Learners and the Type Three Learners tend more to wholebrain dominance than the Type Twos and the Type Fours.
8. The sex variable has some relationship to wholebrain dominance. The girls tested at 33% wholebrained and the boys at 15%.

Distribution of Learning Styles in Teachers and Administrators

In order to determine what relationship exists between learning styles and right-, left- and wholebrain processing preferences, the Kolb Learning Style Inventory and the McCarthy Hemispheric Mode Indicator¹⁵ were administered to 2,367 teachers and administrators during 1986-87. The following tables show the results of these surveys. The sample includes teachers from pre-school to post secondary, a cross-section of content areas, as well as teachers of self-contained classrooms and special education. The participants are from multiple regions of the United States, including Hawaii, as well as a sizeable representation of Canadians.

*The Distribution of
Learning Styles*

N = 2,367

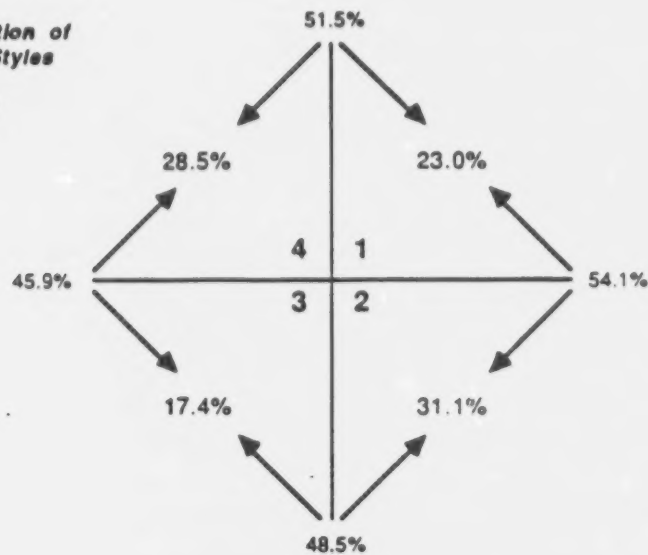


TABLE V.

In Table V, Type Two Learners are the highest number followed closely by Type Fours. Type Ones comprise about one-fourth of the group and Type Threes are the smallest number. The Type Three Learners consistently are the least represented in the teaching staffs surveyed. It is possible their pragmatic nature, their insistence that school be relevant, drives them away. When the number of participants from Quadrants One and Four are added together, the numbers of teachers who tend toward the concrete end of the perception dimension can be seen. 51.5% of the sample favor the concrete.

When this number is contrasted with the sum of the participants from Quadrants Two and Three, it can be seen that 48.5% favor the abstract end of the perceiving dimension. Although slightly tipped in favor of the concrete, these results seem to indicate a fair balance between concrete and abstract preferences in perceiving.

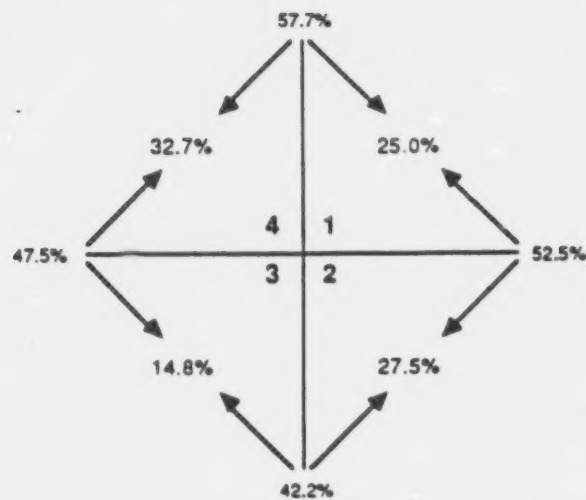
In order to look at the balance or lack of balance along the processing dimension from watching (Reflective Observation) to doing (Active Experimentation), the number of participants in Quadrants One and Two were added to reveal a reflective penchant of 54.1%. That was compared with the sum of participants who were found in Quadrants Three and Four. The results show the reflective dimension has a 10% edge over the active dimension. Given the emphasis in our schools on quiet reading and the passive intake of facts, it is heartening to see such balance between reflection and action.

Learning Styles and Gender: A Significant Relationship

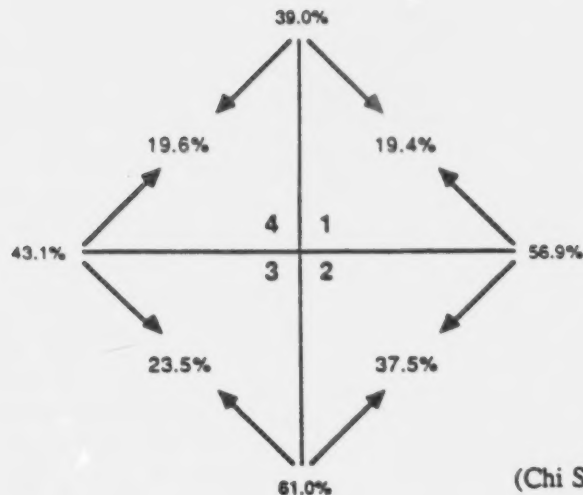
The balance among the four Learning Styles shifts dramatically when the group is divided into female and male. There are more Types One and Four females. 25% of the women are Type One Learners, and 32.7% are Type Fours. The total percentage of females who prefer the sensing/feeling dimension of perceiving is 57.7%. Correspondingly the percentage of women who favor the abstract dimension is 42.2%.

In contrast there are more Type Two and Type Three males than females. 61% of the men are either Type Two or Type Three Learners. So the number of males who prefer the abstract dimension of perceiving, the thinking dimension, is considerably higher than the men who prefer the concrete dimension, the sensing/feeling, 39%. Is this a reflection of a societal bias affecting the freedom of men to feel and women to abstract? Is it possible the Kolb LSI shows the bias operating against the feeling approach to learning for men? And more seriously, does it underline a deepseated bias against all feeling in education.

Female



Male



(Chi Square = 71.1 9< .001)

There are also differences between men and women on the processing dimensions, the reflective versus the active. When the percentages of women in Quadrants One and Two are added together, 52.5% of the women report a preference for the reflective approach to processing experience and information. When the percentages of women in Quadrants Three and Four, the doing dimension, are added together, 47.5% of the women prefer the active dimension. The male percentages show a greater difference. 56.9% are reflective, 43.1% prefer active processing. While both groups have higher scores for the reflective dimension, there is less difference in the women, 5%, than the men at 13%. Perhaps this preference for reflection in both sexes is a result of the unfortunate but ubiquitous penchant in our schools for the passive intake of information as the primary method for acquiring knowledge.

The Hemispheric Mode Preferences of Teachers: Right or Left Mode?

The McCarthy Mode Indicator was used to determine the brain mode preferences of the sample of teachers and administrators. The instrument measures approaches to learning based on preferences for right or left modes. The test also measure tendencies for wholebrain approaches. Wholebrain scores indicate preferences for approaching learning with the ability to flex into both types of information processing. As Table VII indicates, right-mode teachers make up a third of the sample, left-mode teachers equal 40%. When wholebrain favoring percentages are added to mode percentages we see a 43.1% preference for the right-mode and a 49.2% preference for the left-mode. Again the balance is heartening. It is interesting as well. If the educational system is strongly biased in favor of left-mode structures and teaching methods, it is a credit to our teachers that their numbers reflect such a balance.

N = 1,183

WHOLE SAMPLE

40%	9.2%	7.8%	9.7%	33.4%
LEFT	WHOLEBRAIN FAVORING LEFT	WHOLEBRAIN	WHOLEBRAIN FAVORING RIGHT	RIGHT

Table VII.

While this finding is hopeful in terms of a healthy diversity in teaching and administrative staffs, it also causes some concern. Why do teaching methods remain so solidly left mode if approximately 50% of teachers favor wholebrain or right-mode approaches to learning? The answer is that the structure overwhelms the practice. The left-mode characteristics which are so prevalent place emphasis on correct and right information, rewards for conformity, stages of development, compartmentalized content, etc. The structure of the educational enterprise mitigates against right-mode, ergo wholebrain, approaches to learning. This must be changed if right-mode students are to be honored, and if all students are taught to be excellent.

Learning Styles and Hemispheric Dominance: A Significant Relationship

There is a strong tendency toward left mode in Quadrants Two and Three and a strong tendency toward right mode in Quadrants One and Four.

N = 1,186

	ONE	TWO	THREE	FOUR
<i>Learning Style Totals</i>	23.4%	30.8%	17.5%	28.2%
Right	44.8%	9.2%	14.2%	62.0%
Wholebrain Favoring Right	14.4%	5.5%	5.8%	12.6%
Wholebrain	12.6%	5.5%	7.0%	6.8%
Wholebrain Favoring Left	9.5%	11.0%	11.5%	5.6%
Left	18.7%	68.8%	61.5%	13.0%

(Chi Square = 653.1 $p < .001$)

TABLE VIII. (Chi square = 653.1 $p < .001$)

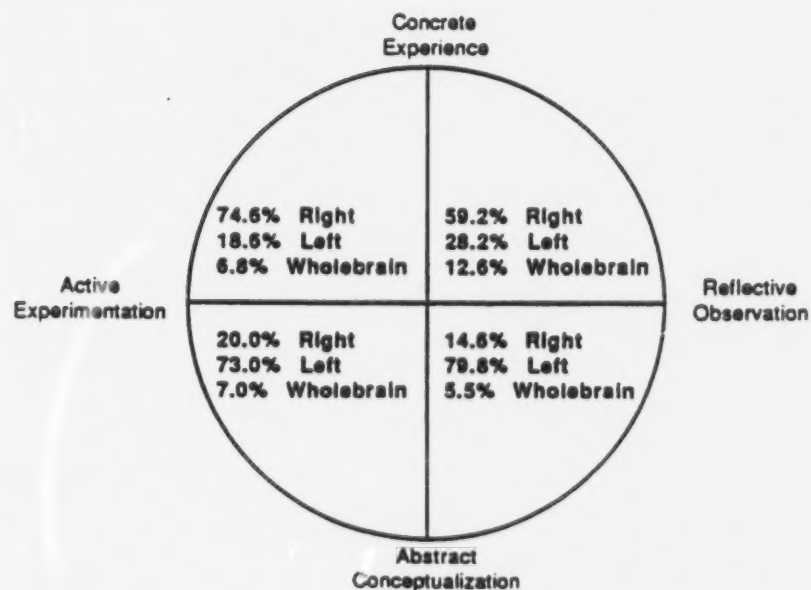


TABLE IX.

The relationship between the concrete and the right mode and the abstract and the left mode is a strong one.

The importance of noting that educators have different learning styles is to convince them of the need to focus on all four quadrants and both right and left mode instruction techniques, even while the struggle to understand what they are continues.

How do we deal with the right mode, with its gestalt, intuitive dimension? Bogen calls it the appositional mind. Webster defines apposition as:

the placing of things in juxtaposition (grammar)
the deposition of successive layers upon those already present (biology)
or the definition of the appositional eye—an insect eye in which entering light reaches the retina of each segment as a single spot and the image is a composite of all the spots.

Perhaps we have enough to begin.

Are Schools Responsible For
Students' Failure?:

A Synthesis Of The Research On Learning Styles

BY

RITA DUNN, JEFFREY S. BEAUDRY,
AND ANGELA KLAVAS

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Are Schools Responsible For Students' Failure?:

A Synthesis Of The Research On Learning Styles

By

Rita Dunn, Jeffrey S. Beaudry, and
Angela Klavas

Throughout history, schools and their teachers have been protected by the fairly widespread belief that students who have not learned have either not paid attention or not tried. In the first half of the century, crowded homes, hunger, family chores, illness, national origin, and religious backgrounds also were suggested as explanations for lack of academic progress, but soon thereafter, IQ, socioeconomic status, or insufficient environmental stimulation became the reasons for the failure of many pupils. Indeed, in those times, being poor was so common that poverty itself was considered adequate motivation toward achievement. Later, in the 1950s and 1960s, rapid growth, extensive family mobility, and belligerent student attitudes became widely accepted reasons for inadequate achievement (Dunn & Dunn, 1978). In the not-too-distant past, however, all those former scapegoats were replaced by the high national divorce rate, one-parent families, teen-age pregnancies, bilingualism, and the impact of the drug culture.

During the past decade, the public gradually has undergone a complete reversal and, today, low achievement is blamed directly on the schools, teachers, and the instructional programs being used. Indeed, the lack of awareness of the research may very well contribute to the academic underachievement of the majority of students who eventually are classified either as dropouts, at-risk, learning disabled, or special education.

Overview of Learning Styles Research

Correlational Studies Concerned with Style and Single Dimensions or Groups

The research examining the learning styles of individuals is extensive (Annotated Bibliography, 1987) and is comprised, in part, of investigations which report interesting aspects of the construct. It includes studies which investigate the relationships between style and: (a) birth order (Cohen, 1986); (b) cognitive development (Melone, 1987); (c) hemisphericity (Clark, 1984; Dunn, Cavanaugh, Eberle, & Zenhausern, 1982); (d) field dependence/independence (Kaley, 1977; Ramirez, 1982; Siebenman, 1984); (e) consistency over subject matter and/or time (Copenhaver, 1979; Miles, 1987; Price, 1980; Virostko, 1983); (f) the preferences of kindergarteners (LeClair, 1986); (g) curriculum implications for kindergarteners (Crino, 1984); (h) artistic talent (Cross, 1982); (i) musical talent (Kreitner, 1981); (j) high IQ elementary students (Dunn & Price, 1980; Griggs & Price, 1979, 1981;

Price, Dunn, Dunn, & Griggs, 1981; Stewart, 1981); (k) the gifted (Ricca, 1983); (l) the need for structure among gifted elementary students (Morgan, 1981); (m) reading achievement (Dunn, Price, & Sanders, 1981); (n) early reading (Dunn, Carbo & Burton, 1981); (o) the intelligence of reading-disabled students (Sinatra, Primavera, & Waked, 1986); (p) the degree to which selected basal readers respond to tactile/kinesthetic preferences (Wolfe, 1983); (q) alternative programs (Dunn & Dunn, 1974; Martin, 1977); (r) malpractice (Dunn, Dunn & Price; 1977; Dunn & Cole, 1979); (s) incarcerated youth (Sinatra, Hirshoren, & Primavera, 1987); (t) dropouts (Gadwa & Griggs, 1985; Johnson, 1984; Third Secondary Study, 1985); (u) high-risk community college adults (Vazquez, 1985); (v) peer learning (Dunn, Dunn, & Sanders, 1974); (w) vocational education (Steinauer, 1981; Tappenden, 1983); (x) young adults in need of remediation (Wittenberg, 1984); (y) the preferences of nontraditional undergraduates (Moore, 1984); (z) adolescent psychiatric patients (Lengal, 1983); (aa) student teachers (Hardy & Moore, 1986); (bb) developing and implementing a teacher-training program (Kulp, 1982); and (cc) self-concept (Dunn, Dunn, Price & Sanders, 1979)--to cite but a few. This type of correlational research, although a necessary first step toward instructional improvement, provides data only concerning what is; it cannot reveal why or show the direction and magnitude of cause-and-effect relationships. Thus, although correlational studies may provide a basis for educated guessing (hypotheses), they cannot predict the cause of academic underachievement or how to reduce it.

The major contribution of these single-dimension or single-group examinations of learning style characteristics is that they repeatedly documented the significantly unique traits among students within the same age or grade, and with similar achievement, talents, and/or interest. That prompted researchers to contemplate whether statistical differences existed between groups.

Correlational Studies Concerned with Style Differences/Similarities Between Groups

The majority of doctoral dissertations in learning styles appear to be comparative; they explored the differences and similarities between diverse groups. Thus, through group comparisons and trained observations, researchers developed awareness of the unique styles of: (a) highly- and poorly-achieving college students (Clay, 1984); (b) right-, integrated-, and left-hemisphere average, gifted, and highly gifted students in grades 5-12 (Cody, 1983); (c) educable mentally retarded and learning-disabled students (Dean, 1982); (d) supervisors and their supervisees (Gould; 1987; McDermott, 1983; Rucker, 1981); (e) teachers and their students (Adams, 1983; Cafferty, 1980; Guinta, 1984; Medikhani, 1980); (f) southeast Asian and American Caucasian college students (Lam-Phoon, 1986; (g) Bahamian and Jamaican high school students (Roberts, 1984); (h) low- and high- reading seventh and eighth graders (Murray, 1980); (i) the learning disabled and the gifted (Pederson, 1984); (j) gifted and non-gifted youngsters

(Ricca, 1983; Vignia, 1983); (k) gifted versus average junior high school students (Griggs & Price, 1980); (l) achieving and underachieving gifted elementary students (Wasson, 1980); (m) vocational and non-vocational students in 11th and 12th grades from rural, urban, and suburban Ohio locations (Tappenden, 1983); (n) learning disabled and non-learning disabled junior high youngsters (Wild, 1979); (o) high- or low- divergent thinkers and feelers (Wittig, 1985); and (p) Afro-, Chinese-, Greek-, and Mexican-American fourth, fifth, and sixth graders (Jalali. in progress).

Several of these correlational studies were ambitious and comprehensive; Cafferty (1980), Cody (1983), Jalali (in progress), Ricca (1983), and Tappenden (1983) made exemplary contributions to the growing body of literature on learning styles. For example, by combining what was learned through single and comparative correlational investigations, educators could piece together consistent characteristics that appeared to represent a learning profile of many gifted youngsters (see Table 1) and begin to experiment with teaching in ways that appear to respond to their strengths (Dunn, Bruno, & Gardiner, 1984; Griggs & Dunn, 1985). Such classroom investigations eventually led to experimental studies of a more formal nature (Perrin, 1984, 1985) and prompted international cooperation in examining the learning styles of different kinds of gifted, such as the mathematically, verbally, musically, artistically, dramatically, manipulatively, and problem-solving gifted (Will Your School, 1988).

The Transition That Led To Experimental Research

Initial studies in learning style revealed that, within a given sample, a significant number of students preferred to learn in ways that differed dramatically from how others in that same group apparently achieved. Of course there were some in each group who were not aware of their styles (Dunn, 1982, 1983)-- either because they did not have strong preferences or because they had not experienced or considered alternatives. For example, in the same class, some youngsters reported that they strongly preferred learning with music, in low illumination, on the floor, couch or an easy chair, and with snacks, whereas some of their classmates required silence, bright lighting, a conventional desk, and no food or other intake (Dunn, Cavanaugh, Eberle, & Zenhausern, 1982). For many, the initial exposure to learning style develops awareness of how they can help themselves achieve (Dunn & Griggs, 1988).

As practitioners compared the two extreme groups' diagnosed styles, they realized that the first group which preferred to concentrate with what most educators would call "distractors", frequently consisted of underachievers, whereas its counterparts often were higher-ranking academics. A few educators began to wonder whether the differences in style contributed to success or failure because of traditional school practices.

Others wondered whether there were consistent differences between the styles of high and low achievers, the gifted and nongifted, the average- and high- performers, and so forth. Thus, researchers began to compare groups, which led to the between-group correlational studies. When they found that extreme groups differed consistently, they wondered, "What would happen if schools provided instructional environments, resources, and/or methods responsive to both types of students?" That led to experimental research of a rigorous, controlled nature.

Research Suggesting Relationships Between Learning Style And Student Achievement

The experimental studies reported herein were conducted at more than 60 institutions of higher education and in schools throughout the United States. They appear to be well-designed and carefully executed but should be analyzed even more critically for elements of internal, statistical conclusion, construct, and external validity (Cook & Campbell; 1979) in future quantitative syntheses.

Research Concerning the Effects of Instructional Environments

Almost a quarter of a century ago, Krathwohl, Bloom, and Massia (1964) reported that, to master new information and skills, people must be aware, willing, and able to concentrate. At that time we had little knowledge that the classroom itself contributes to a major

part of instruction for those learners who exhibit strong preferences for specific elements of learning style; for those, dissonant environments can distract and prevent absorption and retention of knowledge (Dunn, 1987).

Summary Analysis

The findings in the research concerned with instructional environments indicate that: (a) most students can identify their preferences for specific environments, but only between 10-20 percent of K-12 youngsters appear to be affected strongly by this phenomenon; (b) conventional classrooms can be modified-- without much cost-- to respond to the environmental preferences of students for whom the change in design is important; (c) when students with strong learning style preferences are taught/tested in classrooms congruent with their styles, they evidence statistically higher academic achievement (DellaValle, 1984; Dunn, Della Valle, Dunn, Geisert, Sinatra, & Zenhausern, 1986; Dunn, Dunn, & Freeley, 1984; Dunn, Krinsky, Murray, & Quinn, 1985; Hodges, 1985, Krinsky, 1982; MacMurren, 1985; Miller, 1985; Murrain, 1983; Pizzo, 1981, 1982, 1983; Shea, 1983) and attitudes toward learning (Hodges, 1985; MacMurren, 1985; Pizzo, 1981); they also behave better (Hodges, 1985). (see Table 2).

Use the Learning Styles Inventory (LSI) (Dunn, Dunn, & Price) to identify the strong environmental preferences of the 10-20 percent of students for whom they are crucial; expect higher percentages if you are examining the:

styles of underachievers. Redesign the classroom with cardboard boxes, and other items placed perpendicular to the wall to permit quiet, well-lit areas and places for controlled interaction and soft lighting. Permit students to work in chairs, carpeting, bean bags or on cushions as long as they pay attention and perform better than they have previously. Allow raw vegetables for the six percent who require intake while concentrating. Experiment for a six-week period. At the end of that time, if students are not behaving better and earning higher grades than before, stop the trial. If results are positive, consider the implications.

Research Concerning Perceptual Strengths

Several problems have hindered the acceptance of research suggesting the value of teaching students through their perceptual strengths.

- (1) The data are conflicting, often because of inappropriate statistical designs, poor analyses, misinterpretation of the findings, and/or faulty conclusions (Carbo, 1980; Dunn & Carbo, 1981). Conflicting results are an academic problem of most areas of research until rigorous techniques are used to synthesize the results of the range of individual studies.

- (2) A more critical problem for modality research is that previous investigators tended to examine group findings (mean gain scores), which is an inappropriate way to determine whether individuals achieve better or less well in comparison with their own baseline data when taught through their preferences or strengths.
- (3) Most people can learn through two or more channels; it merely is easier through one than the other. Modality tests, however, are relatively insensitive to the delicate differences between able and best channels and most fail to differentiate among auditory, visual, tactile, and kinesthetic strengths.
- (4) Some people refuse to accept that a preference is a strength. When students describe how they are best able to absorb and retain new and/or difficult information, they reveal their learning style preferences. When they then are taught both in the way they said they learn best and in alternative ways, and perform significantly better when matched with their preferences, it can only be concluded that their preference is their strength (Dunn, 1982, 1983).
- (5) Another problem is one of definitions. There is confusion regarding the meaning of the words tactile and kinesthetic:

researchers have persisted in using them differently in their studies. Tactile has to do with learning by using one's hands, but writing with a pencil is not tactile enough for children below the fourth grade. Kinesthetic is learning through the whole body; thus taking a trip, role-playing and dramatization, interviewing, or preparing a luncheon and using correct measurements to prepare the food and table would be kinesthetic. Whenever we taught tactile students through tactile materials or methods, they achieved significantly higher test scores than when they were taught through auditory or visual resources. That was true at the primary (Carbo, 1980), elementary (Martini, 1986; Weinberg, 1983; Wheeler, 1983), and secondary (Kroon, 1985) levels.

- (6) A worse problem is that, even when tactile and kinesthetic preferences or strengths were identified, most researchers did not introduce the new material that way and then reinforce through secondary or tertiary strengths-- which is how academically unsuccessful youngsters should be taught (Dunn, 1984). Tactile materials are easy to make and students often can create them themselves-- which invariably contributes to their learning. Resources which have been successful with tactile underachievers include multi-sectioned Task Cards, Electroboards, Flip Chutes, Pick-A-Holes, Learning Circles and Strips, and games--depending upon which is most appropriate for the maturity level of the population involved (Carbo, Dunn, & Dunn, 1986; Dunn & Dunn, 1978).

- (7) A final problem is the frequent inclusion of older studies conducted prior to 1980-- with the exception of Urbschat (1977)-- with instruments and designs discussed in items one, two, and five above in assessments of the effectiveness of perceptually-based instruction. A case in point is a recent article which used a meta-analysis of studies prior to 1980 which employed many diverse instruments without strong reliability and validity-- but not the LSI, (Dunn, Dunn, & Price). In addition those investigations used different populations, methods, statistical strategies, and group norms. Nevertheless, the authors (Kavale & Forness, 1987) combined their data and concluded that modality-based instruction was ineffective. Unreliable instruments cannot yield reliable data. Certainly different researchers obtain different findings when they use different instruments, populations, and procedures; that is why it is important to replicate studies with similar populations, resources, methods, designs, and instruments. Let's examine the research on perceptual strengths reported in Table 3.

(Insert Table 3 here)

Summary Analysis

As synthesized by Dunn (1988), whenever modalities were identified and students then were taught in matched and mismatched treatments

(Carbo, 1980; Kroon, 1985; Martini, 1986; Urbschat, 1977; Weinberg, 1983; Wheeler, 1983), they achieved statistically higher test and attitude (Martini, 1986) scores in modality-responsive rather than unresponsive, conditions. In addition, when they were taught through multisensory resources, but initially through their primary preference/strength and then reinforced through their secondary and/or tertiary strength (Kroon, 1985; Martini, 1986; Wheeler, 1980), their scores catapulted ever higher by an additonal .05.

Crino (1984) and LeClair (1986) substantiated Carbo's (1987a, 1987b) and Price's (1980) findings that young children tend to be far more tactile/kinesthetic than either auditory or visual. Gardiner (1986) then documented that underachievers taught tactually and kinesthetically achieved statistically higher than they did through any other sense or combination of senses. Thus, young and underachieving students should be introduced to new material with a hands-on approach or through Electroboards, Pick-A-Holes, or Flip Chutes, reinforced visually, and then auditorially. For specific direction on how to do this with a class of 30 or more, see Dunn (1984) which diagrams how students should be taught to teach themselves through their perceptual and chronobiological strengths.

Research Concerning Sociological Preferences

Table 4 demonstrates that, in four of five studies, when students' sociological preferences were identified and the youngsters then were

taught in multiple treatments both congruent and incongruent with their diagnosed characteristics, they achieved significantly higher test scores in matched conditions and significantly lower test scores when mismatched. In the three studies where attitudes were included as a dependent variable, those also were significantly higher in matched conditions. In the one investigation where an interaction effect did not occur (Cholakis, 1986). the population had been comprised of students attending a parochial school. The researcher suggested that the history of strong authority-orientation of those youngsters may have intervened. However, students apparently learned equally well in both conditions.

If, as these studies reveal, students learn better and like it more when they are taught through their sociological preferences, why do proponents of various forms of cooperative learning find better results with teaming approaches than with conventional instruction?

1. The higher the grade level, the less teacher-motivated students become (Price, 1980). There are more peer-oriented youngsters able to learn better in small-groups than youngsters able to learn directly from the teacher. Nevertheless, in every class there are students who learn best by themselves with appropriate resources, students who learn best with peers, and students who do not need to work directly with the teacher to achieve (DeBello, 1985; Giannitti, in progress; Miles, 1987; Perrin, 1984; Price, 1980).

2. Although the junior high school years are considered strong periods for peer influence, there is a greater need to learn/study alone among more students in grades 9, 10, 11 and 12 than during any other interval (Price, 1980)-- except among the gifted, many of whom prefer to learn alone-- unless the material is extremely difficult, at which point they prefer to learn with peers (Perrin, 1984). Thus, except among the gifted, during grades 3-8, many students will learn better in small-groups than either alone or with their teacher but (a) after grade 8, many learn better alone and (b) in every grade 3-12, some students learn best alone, others learn best in teams, and others learn best with the teacher.
3. The younger the child, the more tactile/kinesthetic he/she is (Crino, 1984; Dunn & Dunn, 1978; Keefe, 1982; LeClair, 1986; Price, 1980). These modalities are followed by the development of visual channels and, beginning with grades 5 and 6, the beginning development of auditory strengths (Price, 1980). Thus, it is easier for students to read and discuss together and learn in that process than to sit and listen to the teacher for any length of time (more than 12-15 minutes).
4. The need for mobility is so strong among some youngsters, in some cases reaching as high as 50 percent, that it actually inhibits their ability to concentrate (DellaValle, 1984; Miller, 1985).

Thus, students who can move in their seats, squirm, and frequently change position in a teamed experience are less uncomfortable than when they are required to sit erect/semi-erect and learn by listening to the teacher.

5. Among the team members may be youngsters with varied processing styles, as opposed to a teacher with one dominant style. Thus, should the material to be mastered be difficult, someone in the group can explain it to the classmate whereas, should the learner's and the teacher's global/analytic styles be opposite, the student may try to learn, but may experience great difficulty.

Summary Analysis

The research demonstrates that students (a) have different sociological preferences and (b) when matched with their preferences, they achieve better and like learning more. It is easy for teachers to post an assignment with specific objectives and say to the class, "You may learn this alone, in a pair, or in a team of three or four, or with me. If you wish to work alone, sit wherever you will be comfortable in the room. If you wish to work in a pair, take a moment to decide where you will sit, but stay away from those needing to be by themselves." After a momentary pause, students who wish to work in a small group may move together quietly and, after that, those who wish to work directly

with the instructor may move to a designated section of the room. We strongly recommend, however, that Team Learning and Circle of Knowledge-- specific small-group instructional strategies*-- should become an integral part of a class' repertoire prior to permitting sociological choices. These strategies enable students to work efficiently either alone or in a group for a lengthy period of time, thus allowing teachers sufficient time to teach the smaller group without interruption and permitting students to, in effect, learn responsibly.

Research Concerning Time-Of-Day Preferences

Few adults dispute the contention that some people function better in the morning whereas others perform best at night. Researchers in the field of chronobiology reported circadian rhythms or patterns of high or low performance on a daily basis (Griggs, 1980). Task efficiency, for example, was found to be related directly to each person's temperature cycle (Biggers, 1980).

The past decade witnessed many innovations concerned with capitalizing on workers' strongest energy levels (Silverstein & Srb, 1979). For example, flextime, a system permitting employees a choice of hourly schedules, resulted in increased productivity when working hours were matched to individuals' preferences. In one urban center, police and nurses were provided "shift choices"; instead of rotating

*Team Learning, Circle of Knowledge, and other structured small-group instructional techniques can be learned through Dunn and Dunn (1978) or a Teacher Inservice Package (TIP) that permits teachers to learn through their learning styles. The TIP on Alternatives to Lecture is available from our Center for the Study of Learning and Teaching Styles, St. John's University.

midnight (the graveyard shift), morning, and late afternoon assignments, individuals' preferences for specific shifts were honored. The results were reduced absenteeism, higher morale and, in the case of the police, a better arrest and conviction record. In addition, several hospitals initiated surgical operations and the administration of drugs based on patients' circadian rhythms.

Research on classroom-related instructional conditions and the ways in which time preferences affect students has accelerated in the past decade. For example, two junior high school principals in Georgia (Carruthers & Young, 1980) revealed that math underachievers who preferred learning in the afternoon, but had been scheduled into morning classes, became more motivated and better disciplined, and produced a trend toward statistically increased achievement, when they were assigned to afternoon math classes. Three years later, Lynch (1981) reported that time preference was a crucial factor in the reversal of chronic and initial truancy patterns among secondary students. By 1983, the matching of elementary students' time preferences and instructional schedules resulted in significant achievement gains (.001) in both reading and math (Virostko, 1983; Dunn, Dunn, Primavera, Sinatra, & Virostko, 1987). The following year, teachers' time preferences were identified, and inservice sessions were conducted in both matched and mismatched sessions (Freeley, 1984). Interestingly, teachers implemented innovative instructional techniques significantly more often (.01) when they were

instructed at their preferred times. Then Lemmon (1985) administered the Iowa Basic Skills Achievement Tests in reading and math to groups whose time preferences matched their test schedule--either morning or afternoon. She found significantly higher test gains in both reading and math as compared with each child's previous three years' growth.

Among the more interesting findings of 20 years of research with learning style time preferences is that most students are not most alert early in the morning-- a misconception frequently promulgated in teacher education classes. At the elementary level, approximately 28 percent appear to be "early birds"; many children do not appear to come alive until either late morning (after 10:00 a.m.) or early afternoon; most children's highest energy level occurs between 11:00 a.m. and 2:00 p.m.-- during which time they normally experience a one-hour lunch period.

Approximately one-third of junior high schoolers are alert in the early morning but the majority, again, are late morning/afternoon preferents. At the high school level, almost 40 percent are prepared to concentrate on difficult information in the morning; a majority continue to be late morning/afternoon preferents and, for the first time since infancy, a large number are "night owls" (almost 13 percent). Among adults there is a majority of early morning, high-energy people, but many of those experience extreme energy depressions after 1:00 p.m. and another large group is "dead" all day and alert in the evening. There are ex-

ceptions to these date, but if you test your students with the Learning Style Inventory (Dunn, Dunn, & Price)-- or test your faculty with the Productivity Environmental Preference Survey (Dunn, Dunn & Price) you are likely to find essentially similar data.

Imagine the irritation that occurs when the high-energy teachers greet their classes (comprised of low-energy students) early in the morning. Teachers issue a series of verbal directives with which only a small percentage of youngsters can cope (low energy and low auditory). Conversely, in the afternoon when many teachers are at a low, most of their charges are bursting with energy and require a great deal of activity, mobility, and interaction.

Summary Analysis

Tell students when to do their homework (at their energy high). Permit them to register for their most difficult courses at their best time of day. Administer standardized tests in the early morning, late morning, and afternoon, and assign students to take them at their best time-of-day. Teach young children to read when they are most able to concentrate on the material. This is one of the more crucial elements of learning style and demands attention-- particularly for dropouts (Gadwa & Griggs, 1985; Johnson, 1984; Third Secondary Study, 1985), vocational education (Tappenden, 1983), and underachieving students (Gardiner, 1986)-- for whom learning at their best time of day significantly increases achievement.

Research on Emotionality

Our own findings on structure parallel those of David Hunt (1979); the younger the students are, the more structure they need (Price, 1980). This appears to be opposite of how we program our schools; kindergarteners have multiple choices on a daily basis and secondary students, of whom many are self-structured and nonconforming, are required to adhere to identical rules and regulations.

Underachievers require more structure than high achievers and appear to learn better when provided specific directives, but do not necessarily like being told what to do and how to do it (Napolitano, 1986). On the other hand, students whom we perceive as being highly responsible are conforming; those who do not follow our regulations are nonconforming, and nonconformists do not learn via conformity (White, 1981; Dunn, White, & Zenhausern, 1982). To get nonconformists to do what you want them to do: (a) speak to them collegially rather than authoritatively; (b) explain why it is important to you that they do what you ask; and (c) give them choices of how to demonstrate that they have done what was requested (White, 1981).

Previously unmotivated students become visibly motivated within six weeks of being permitted to work through their learning styles--often in less time. Once students begin to achieve, their motivation increases. Gifted students tend to be among the more motivated;

underachievers are not, but the latter are often taught by teachers in environments and through perceptions, sociological groupings, and resources that are disparate from their learning style preferences.

Summary Analysis

Provide direction for students who need structure and choices for low-structured (self-structured) individuals. Tell students specifically what is required, but permit nonconformists (low on responsibility) to do the assignment their way. Share the information on learning styles and encourage students to study through their strengths. Give them "room to breathe" but permit them to work environmentally and sociologically as they wish-- provided they work quietly and learn what is required.

A Separate Look at Mobility Needs

Fadley and Hosler (1979) noted that children often were referred to psychologists because of their consistent hyperactivity; their teachers complained that such youngsters were unable to sit quietly and pay attention during class. After extensive study, those psychologists reported that most students sent to them were not at all clinically hyperactive; instead, they were normal children in need of movement. In addition, the less interested the children, the more mobility they appeared to need. Another disquieting point made was that those youngsters were "almost always boys" (p. 219).

During the same period, Restak (1979) substantiated that "over 95% of hyperactives are males" (p. 230) and that the very same characteristic, when observed in girls, was correlated with academic achievement. He deplored that boys were required to be passive in school and were rejected for aggressive behaviors there, but were encouraged societally to engage in typical male aggressions in the world at-large-- a situation which might lead to eventual role conflict. Restak added that conventional classroom environments did not provide male students with sufficient outlet for their normal movement needs. He warned that schools actually caused conflict with societal expectations that boys not be timid, passive, or conforming.

By 1983, Tingley-Mitchaelis had corroborated Restak's admonitions. She affirmed that youngsters who had been labeled hyperactive in school often were fidgety because their teachers had provided them with experiences "to think about something"; instead, those children needed "to do something" (p. 26). Tingley-Michaelis also chastised educators for believing that activities prevented- rather than enhanced- learning.

Once researchers began equating hyperactivity with students' normal need for mobility, they experimented with permitting many opportunities for learning while engaged in movement. Reports then documented that, when previously restless youngsters were reassigned to classes that did not require passivity, their behaviors were rarely noticed (Fadley & Hosler, 1979; Koester & Farley, 1977). Eventually teachers reported that,

whereas selected students thrived in an activity-oriented environment which permitted mobility, others remained almost exclusively in the same area despite frequent attempts to coax them to move (Hodges, 1985; Miller, 1985). That led to Fitt's (1975) conclusions that no amount of persuasion increased certain children's interest in movement, whereas others found it possible to remain seated passively for extended periods. "These are cases of a child's style... governing his interaction with and within the environment" (p. 94).

The DellaValle (1984) research, which won three national awards, documented that almost 50 percent of a large urban high school's students could not sit still for any length of time. Twenty-five percent could sit, if interested, and the remaining youngsters preferred passivity. Her research clearly demonstrated that the mobility/passivity dimension of learning style played an important part in the ability of both groups to achieve in school. When preference and environment were matched, the students' performance yielded significantly higher test scores than when preferences and environment were mismatched (.001). During the past three years, when discussing mobility needs with adult audiences, we asked those who found that they could not sit still in a regular wooden seat for more than 12-15 minutes to stand. Everyone present was consistently impressed to find the majority of males and many females suddenly on their feet.

Summary Analysis

Permitting student movement while learning implies neither chaos, random activities, disturbances, nor loss of control (Cavanaugh, 1981; K. Dunn, 1981; Fiske, 1981; Hodges, 1982, 1983; Jenkins, 1982; Lemmon, 1982). Reinert (1977) recognized that a technique as simple as pacing the floor while reading assisted secondary students with memorization. Thus, consider the following possibilities:

- (1) Establish varied instructional areas in or near each- or each group of- classroom(s) so that mobility-preferenced students who complete one task may move to another center or station to continue their work.
- (2) Experiment with independent study for youngsters who work best by themselves or with small-group techniques for the peer-oriented who need mobility.
- (3) Use independent study projects or Contract Activity Packages that require a hands-on approach, such as building, acting, drawing, demonstrating, dancing, painting, or interviewing for those who need mobility.
- (4) Permit students who require mobility to move to the library resource center, office spaces, media corners, and other classroom or school areas for materials, small-group interactions, projects, and to complete assignments- provided their subsequent behavior and grades demonstrate the value of such experimentation (Dunn, DellaValle, Dunn, Geisert, Sinatra, & Zenhausern, 1986).

Research on Learning Style and Hemisphericity

Zenhausern (1978) proposed a cognitive style termed "hemispheric dominance" based on the differential efficiency of the two hemispheres. Verification of that model has been found in the area of thinking style (Zenhausern & Repetti, 1979), brain processing (Coleman & Zenhausern, 1979), memory (Zenhausern & Gebhardt, 1979), and maze learning (Zenhausern & Nickel, 1979). Levy (1979) described the left brain as analytic in approach, the right as holistic or global.

The terms left/right, analytic/global, and inductive/deductive have been used interchangeably in the literature (Brennan, 1984; Levy, 1979; Brennan, 1982a; 1982b; Ramirez & Castanada, 1974; Tanenbaum, 1982; Trautman, 1979; Zenhausern, 1978); the descriptions of those variables tend to parallel each other. Being impulsive appears to be a dimension common to most people at times, but it is more prevalent among right/global/deductives: the reverse seems accurate for reflectivity (Mateson, 1980). However, what is crucial to understanding brain functioning is that both sides of the brain reason, but by different strategies (Levy, 1979; Zenhausern, 1980); each strategy "is a reflection of a trend toward optimalization of efficient use of neural space" (Webb, 1983).

Thus, whether people are left- or right- processors, analytic or global, inductive or deductive, they are capable of mastering the identical information or skills if they are taught through instructional resources

that complement their hemispheric, or processing style. That conclusion was documented in mathematics at the elementary (Jarsonbeck, 1984), high school (Brennan, 1985), and community college (Bruno, in progress) levels, in high school science (Douglas, 1979) and in junior high social studies (Trautman, 1979). Each of those researchers identified hemispheric styles, and found that students taught through matched materials achieved statistically higher test scores than they did when mismatched. It therefore would seem appropriate to teach students through their processing styles rather than (a) ignore their hemispheric characteristics, (b) teach them incorrectly, or (c) expect that they will change their styles to respond to how we teach. The difficulty, if not impossibility, of changing one's style was documented by Kagan (1966) whose "success" with training impulsive students to become more reflective was evidenced only when adults were present. In addition, although his sample learned to respond more reflectively than previously, its accuracy on tasks was decreased.

When examining the relationships between the hemispheric and learning style preferences among 240 average, gifted, and highly-gifted children in grades 5-12 (Cody, 1983), 353 biology students in grades 9-12 (Dunn, Cavanaugh, Eberle, & Zenhausern, 1982), and more than 800 community college, adult math underachievers, the following data were revealed:

- (1) When concentrating, students who: (a) either were not distracted by sound or who worked better with sound than in silence; (b)

preferred dim, rather than bright illumination; (c) required an informal, rather than a formal design; (d) were less motivated than their peers toward academic learning; (e) preferred learning directly with peers rather than alone or with the teacher; (f) were not persistent, in that they were not concerned about finishing assignments they began; rather, they preferred frequent "breaks" and working on two or more tasks simultaneously; and (g) appeared to learn better through a tactile, hands-on approach than by listening or reading, scored significantly more right-hemisphere than left hemisphere (Dunn, Cavanaugh, Eberle, & Zenhausern, 1982).

(2) Students who were most persistent consistently scored as left hemispheric processors (Dunn, Cavanaugh, Eberle, & Zenhausern, 1982). This finding may have implications for future Time-On-Task studies.

(3) Left-hemispheric students in grades 5-12 preferred a formal, rather than informal study design, more structure and less intake (while learning) than their classmates, and were more visual, but less tactile/kinesthetic than their right-preferenced classmates (Cody, 1983).

(4) Right-hemispheric students in grades 5-12 disliked structure and were not adult-motivated, but were strongly peer-motivated (Cody, 1983).

(5) Gifted and highly-gifted 5th-12th graders demonstrated significant preferences ($p < .001$) for right hemisphere and integrated processing (Cody, 1983).

(6) Right-hemispheric, community college, adult math underachievers preferred learning with sound (p .001) and intake (p .02) and wanted tactile and kinesthetic instructional resources (p .001) and mobility (p .082) while learning. Their left-hemisphere counterparts required bright light (p .065) and a formal design (p .082). When the predominantly right-brained students were taught with global and analytic lessons, they achieved statistically higher test scores (p .0004) through the global, than through the analytic materials (Bruno, in progress).

Summary Analysis

Right/global/deductive students require a different environment from conventional classrooms. They may need more encouragement and short, varied tasks because of their lesser motivation and persistence levels. More than left/analytic/inductives, they require interesting lessons with which they can become involved actively; they certainly require frequent successes to increase their motivation. Hart (1983) insists that these are requirements for all children; without doubt, they are crucial for globals. Other research by Lysakowski and Walberg (1982) and Walberg, (1986) have identified these and similar factors, i.e. motivation, cues, participation, corrective feedback, and reinforcement, as critical qualities of instruction.

Instrumentation

Of the two international, three national, and eight First-Finalist research citations awarded to students and/or staff at St. John's University's Center for the Study of Learning and Teaching Styles between 1979-1988, all but one employed the Learning Style Inventory (LSI) (Dunn, Dunn, & Price). Ohio State University's National Center for Research in Vocational Education published the results of its two-year study of instruments that identify learning styles and reported that the LSI had "established impressive reliability and face and construct validity" (Kirby, 1979, p. 72). Since examination by the Ohio State University's National Center almost a decade ago, the LSI also has evidenced predictive validity (Bruno, in progress; DeBello, 1985; Della Valle, 1984; Giannitti, in progress; Hodges, 1985; Krinsky, 1982; Kroon, 1985; Lynch, 1981; MacMurren, 1985; Martini, 1986; Miles, 1987; Murrain, 1983; Pizzo, 1981; Shea, 1983; Spires, 1983; Virostko, 1983; White, 1981).

In a recent comparative analysis of the style conceptualizations and psychometric standards of nine different instruments that measure learning style instructional preference, the Dunn, Dunn, and Price LSI was the only one rated as having good or very good reliability and validity (Curry, 1987). Of the 18 instruments reviewed, including an additional nine concerned with information processing, the LSI was one of only three with good or very good reliability and validity. The LSI is a test which is easy-to-administer and interpret. Perhaps because of that, Keefe (1982) revealed that it "is the most widely-used assessment instrument

in elementary and secondary schools" (p. 52). It is one of only three comprehensive learning style identification instruments in existence; most others describe only one or two variables on a bipolar continuum, whereas the LSI describes 21 different characteristics and provides correlations that indicate the extent to which a student is global or analytic, for example.

If you want to examine the effectiveness of learning styles-based instruction firsthand, identify the styles of those students in most need of your help. Teachers cannot correctly identify all the elements of style (Dunn, Dunn, & Price, 1977; Marcus, 1977a); they often misinterpret behaviors and misunderstand symptoms. We recommend that you identify the learning styles of (a) primary children (grades K-2) with the Learning Style Inventory: Primary Version (Perrin, 1982), (b) students in grades 3-12 with the LSI (Dunn, Dunn, & Price),-- or (c) write to our Center for a free Resource Brochure which includes descriptions of these instruments and the books we recommend to explain the concept of learning style to students prior to testing them.

Ramifications of the Research on Learning Styles

(1) Both Restak (1979) and Thies (1979) ascertained that selected learning style characteristics are genetic and others are developed through experience. Individual responses to sound, light, temperature,

body posture while concentrating, perceptual strengths, intake, time-of-day energy levels, and mobility are biological, whereas sociological preferences, motivation, responsibility (conformity), and structure versus the need for options are thought to be developmental. The significant differences among the learning styles of diverse cultures tend to support this theory (Jalali, in progress; Lam-Phoon, 1986; Jacobs, 1987; Mariasch, 1983; Roberts, 1983; Stodolsky & Lesser, 1967).

(2) Within each culture, socioeconomic strata, or classroom there are as many differences as there are between groups. Within each family there are children with left and right brain and global and analytic preferences who may either require or need music, and so forth.

(3) Every human being has a learning style and every human being has strengths. It is highly improbable that any one person has only strengths. However, it is important to teach people to capitalize on those they do have. For example, our Center for the Study of Learning and Teaching Styles has a computer disc that analyzes how each individual should study and do homework based on unique learning style predispositions for 21 different elements. In a given class, few students could or should be directed to do homework in exactly the same manner (Clark-Thayer, 1987; Dunn, 1984).

(4) No learning style is better-- or worse-- than any other style.

Each style has similar intelligence ranges. What causes problems for so many global children is that the majority of their teachers are analytic and the mismatch that occurs between the teachers' and their students' styles contribute to lack of achievement (Cafferty, 1980).

(5) "Significant difference", the statistical statement which indicates differences among groups, only demonstrates more of one type than another. It is important to remember that, despite significant differences, all groups (cultural, academic, male/female) include all types of learning styles.

(6) Marcus (1977b, 1979) revealed a variety of differences distinguishing how male and female adolescents learned. Two years later, Restak (1979) documented the auditory superiority of girls which may enable girls to remember what they hear more successfully than boys. He also attempted to explain why so many boys experience difficulty in traditional schools.

The male brain learns by manipulating its environment, yet the typical student is forced to sit still for long hours in a classroom. The male brain is primarily visual, while classroom instruction demands attentive listening. Boys are clumsy in fine-hand coordination, yet are forced at an early age to express themselves in writing. Finally, there is little opportunity in most schools, other than during recess periods, for gross movements or rapid responses. In essence, the classroom, in most of our nation's primary schools are (sic) geared to skills that come naturally to girls but develop very slowly in boys. The results shouldn't be surprising: a "learning disabled" child who is also frequently "hyperactive" (Restak, 1979; p. 230).

- Combining:
- (1) Restak's (1979) assertions that the male brain learns through activity-- as opposed to passivity, and that
 - (2) girls remember better than boys what they hear, with
 - (3) Keefe's (1982) verification that young children tend to be primarily tactile and kinesthetic (with auditory strengths developing sometime after fifth or sixth grade), with
 - (4) Carbo, Dunn, and Dunn's (1986) findings that young children tend to be global rather than analytic, with
 - (5) the correlations between globality and needing sound, soft light, informal seating, intake, frequent breaks, and lots of encouragement because of relatively low motivation toward academics, with
 - (6) Cohen's (1969) and Shade's (1983) findings that school settings demand analytic, rather than, global styles.

it is not difficult to understand why 85 percent of poor readers are global (Golden, 1981; Oexle & Zenhausern, 1981). The majority of poor readers throughout the United States are global and boys; they do not learn easily by remembering the differences among sounds but are taught to read through phonics-- an analytic, auditory method (Carbo, 1987a). The majority of children in need of speech therapy also appear to be boys, as are the majority of children classified as Learning Disabled. The majority of underachievers are tactile/kinesthetic. Dropouts also have been classified as tactile/kinesthetic; in addition, they are peer-motivated, require considerable mobility, prefer to structure tasks their way, and are not morning people (Gadwa & Griegs, 1985; Johnson, 1984)-- characteristics to which most schools are unresponsive.

Are schools responsible for the failures of at least 10-20 percent of students? A synthesis of the research on learning styles has begun to suggest that they are.

TABLE 1
CHARACTERISTICS OF GIFTED STUDENTS*
AS REPORTED IN SELECTED STUDIES

Researcher, Date	INTERNALLY CONTROLLED: NEEDS LITTLE STRUCTURE; INDEPENDENT	PERSISTENCE	STRONG PERCEPTUAL PREFERENCES	LEARN BEST ALONE	PREF. GAMES, PROJECT INDEPENDENT STUDIES
CROSS 1982	*			*	
DUNN & PRICE 1980	*	*	*		
GRIGGS & PRICE 1980		*	*	*	
KREITNER 1981	*		*	*	
PRICE, DUNN, DUNN, GRIGGS 1981		*	*	*	
RICCA 1983	*	*	*	*	*
STEWART 1981	*				
WASSON 1980	*				

* Although "the gifted are no longer viewed as a single homogeneous group" (Ricca, 1984, p. 12)), They reveal learning style characteristics that differ significantly from those of both average and underachieving populations.

Table 2

EXPERIMENTAL RESEARCH CONCERNED WITH LEARNING STYLES AND INSTRUCTIONAL ENVIRONMENTS

Researcher/Date	Sample	Subject Matter	Element Examined	SIGNIFICANT EFFECTS	
				Achievement	Attitudes
DellaValle 1984	7th Graders	Word Recognition Memory	Mobility/Passivity Needs	+	NOT TESTED
DeGregoris 1986	6th, 7th 8th Graders	Reading Comprehension	Kinds of Sound needed by Sound Preferences	+ With Moderate Talking	NOT TESTED
Hodges 1985	7th, 8th Graders	Mathematics	Formal/Informal Design Preferences	+	+
Krimsky 1982	4th Graders	Reading Speed and Accuracy	Bright/Low Lighting Preferences	+	NOT TESTED
MacMurren 1985	6th Graders	Reading Speed and Accuracy	Need for Intake While Learning	+	+
Miller 1985	2nd Graders	Reading	Mobility/Passivity Needs	+	NOT TESTED
Murray 1983	7th Graders	Word Recognition/ Memory	Temperature Preference	0	NOT TESTED
Pizzo 1981	6th Graders	Reading	Acoustical Preference	+	+
Shea 1983	9th Graders	Reading	Formal/Informal Design Preferences	+	NOT TESTED
Stiles 1985 SO	5th Graders	Mathematics Testing	Formal/Informal Design Preferences	0	NOT TESTED

* Price (1980) reported that the older students became, the less they appeared able to adapt to a conventional setting. Thus, Design may be far more crucial to secondary students' ability to concentrate than to fourth graders who may be better able to adjust to this element. (Dunn and Griggs (1988) described the importance of Design to high schoolers throughout the United States

(+) = significant positive findings at $p \leq .01$ or greater - (0) = no differences or slight trend

TABLE 3

Experimental Research Concerned With
Perceptual Learning Styles

Researcher, Date	Sample	Subject Examined	Perceptual Preference Examined	Significant Findings	
				ACHIEVEMENT	ATTITUDE
CARBO, 1980	Kindergarteners	Vocabulary	Auditory, Visual, "Other" (tactile)	++	Not Tested
JARSONBECK, 1984	4th Grade Underachievers	Mathematics	Auditory, Visual Tactile	+	Not Tested
KROON, 1985	9th, 10th Graders	Industrial Arts	Auditory, Visual, Tactile Sequenced	+	Not Tested
MARTINI, 1986	7th Graders	Science	Auditory, Visual, Tactile	+	+
URBSCHAT, 1977	1st Graders	CVC Trigram Recall	Auditory, Visual	+	Not Tested
WEINBERG, 1983	3rd Graders	Mathematics	Auditory, Visual Tactile	+	Not Tested
WHEELER, 1980	Learning Disabled 2nd Graders	Reading	Auditory, Visual, Tactile Sequenced	+	Not Tested
WHEELER, 1983	Learning Disabled 2nd Graders	Reading	Auditory, Visual, Tactile	+	Not Tested

* (+) positively significant findings.

TABLE 4

Experimental Research Concerned With Sociological Preferences

Researcher	Date	Sample	Subject Examined
Cholakis	1986	106 underachieving, inner city, parochial school 7th and 8th graders	Vocabulary development was provided through three strategies-- by the teacher, alone by themselves, and in a peer group treatment.
Findings: Those who preferred learning alone, scored significantly higher (.01) than those who preferred learning either with peers or the teacher. However, all students attained significantly higher achievement (.001) and attitude (.01) scores when learning with an authority figure.			
DeBello	1985	236 suburban 8th graders	Students wrote social studies compositions and then experienced revision strategies that were congruent and incongruent with their sociological preferences.
Findings: Peer learners scored significantly higher when matched with the peer-conferencing technique (.01). Authority-oriented learners, when revising through the teacher-conference, achieved statistically higher (.01) than when revising either through peer conferencing or self-review. And those who preferred to learn alone, scored significantly higher (.01) when matched, rather than mismatched, with self-review. No learning style group achieved better than any other, but a significant interaction occurred between individual sociological style and the matched method of revision (.001). In addition, the attitudes of students who preferred to learn alone or with an adult were significantly more positive (.01) when they were assigned to approaches that matched their styles.			
Giannitti	In Progress	104 suburban, parochial and public school 6th, 7th, and 8th graders	Social studies taught through both a mini-Contract Activity Package (CAP) and a small-group strategy, Team Learning
Findings: Peer-oriented students achieved significantly higher test and attitudes scores when learning through Team Learning than through the mini-Cap (.01). Learning-alone preferents attained significantly higher test and attitude scores (.01) through the mini-Cap than with their peers. Non-preferenced students achieved better through the mini-Cap than through the Team Learning and liked working alone better than in groups. A significant interaction occurred between learning alone and peer-preferenced learning and the method of learning (mini-Cap and Team Learning)			
Garrin	1984	104 gifted and nongifted, suburban 1st and 2nd graders	Problem-solving and word recognition through both individual- and peer-group strategies. Learning- with- the- teacher was eliminated as a strategy when not a single gifted child preferred to learn that way.
Findings: Analysis of the mean gain scores revealed that achievement was significantly higher (.05) whenever students were taught through approaches that matched their diagnosed sociological preferences. Although the gifted tended to prefer to learn alone in their heterogeneously-grouped classes, a small group of seven gifted who previously had known each other from participation in a special, part-time program for the gifted actually performed best when learning in isolation with other gifted children.			
Giles	1987	40 inner city 5th and 6th graders	Twenty-two who preferred to learn alone and 18 who preferred to learn with peers were assigned randomly to two instructional groups and taught career awareness and career decision-making concepts in condition both congruent and incongruent with their preferences.
Findings: The matching of sociological preference with complementary grouping patterns increased achievement significantly on career awareness (.01) and career decision-making (.01). In addition, students' attitude scores were statistically higher when they were taught career awareness (.01) and career decision-making concepts (.05) in patterns accommodating their sociological preferences. With the exception of career awareness achievement, neither sociologically preferenced group achieved better than the other but Learning Alone preferents scored higher (.05) than Peer-preferenced individuals.			

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DISCUSSION DRAFT

THEORIES OF LEARNING STYLES, NEUROSCIENCES, GUIDED IMAGERY
SUGGESTOPEDIA, MULTIPLE INTELLIGENCES AND INTEGRATIVE LEARNING

A DISCUSSION OF THEIR APPLICATION TO THE ENHANCEMENT OF LEARNING
AND THE IMPROVEMENT OF STUDENT PERFORMANCE

PREPARED FOR THE NEW YORK STATE BOARD OF REGENTS

PANEL ON LEARNING STYLES

BY

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THEORIES OF LEARNING STYLE, NEUROSCIENCES, GUIDED IMAGERY,
TRANSPERSONAL PSYCHOLOGY, SUGGESTOLOGY
MULTIPLE INTELLIGENCES AND INTEGRATIVE LEARNING

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Introduction

Perhaps the greatest tragedy in this century is the enormous waste of human talent in the face of advances in science, medicine and technology. Despite the interruption of wars and economic depression, the United States never held a public policy priority of enhancing the greatest talents hidden within each of us. It is as if the land of plenty would be available to those of good fortune, fortitude and hard work, whose future could be altered through achievement in the public schools. Some have mistakenly called this the "Puritan Ethic," while others, like Nineteenth Century educator Horace Mann call it the "social balance wheel. It has also been referred to as the dominant cultural principle of the industrialized west.

Under any circumstances, the nation is now described as "at risk." New vision, purpose and direction is being called for by the young and old, by rich and poor, by voters and politicians, by educators and chief executive officers of the fortune 500 companies.

Since 1983, the significance of the "nation at risk" reports from various Commissions, Foundations and state councils makes it very clear that the challenges for increasing high school completion rates and expanding access to economic prosperity are jeopardized under current educational practices and policies.

Symptomatic of this concern, in 1988 the State of New Jersey assumed the responsibilities and authority of the Board of Education in Jersey City, while Boston University agreed to operate the Chelsea school system at the request of educational officials of the City of Chelsea, Massachusetts. Both of these decisions are unprecedented in the history of educational administration in the United States and represent major concerns over the future direction of public education in areas of high high school attrition, high unemployment and low income generating communities.

Obviously, behind these decisions are many factors which are unique to the both cities. But in both cases, public officials felt that the stakes were so high that the current lack of student performance and excessive drop out rates were of such serious concern as to threaten the foundation of a next generation of the workforce.

Although neither New Jersey nor Massachusetts tell the whole story of crises in education, the national trends suggest the need for a major re-thinking of the structure, purpose and direction of the schools as useful resources to prepare the next generation of citizenship and the workforce including the many people, and several different cultures, who are entitled to gain access to the benefits of economic and social prosperity in post industrial America.

If we are to make education a living value for all of our people, while increasing high school completion then operating under the traditional paradigms of the status quo will continue to perpetuate the national malady.

The deterioration is described by Dr. Paul Messier, a senior policy analyst at the United States Department of Education: "...Over 60% of our students do not complete school. 95% of our students graduating from high school don't think much of themselves. At least 13% of all seventeen-year-olds are illiterate. Average achievement scores are lower than 25 years ago. 23 million American adults are illiterate. Fewer than half of our gifted students perform up to their ability levels. Over ten percent of our students have been designated learning disabled. Suicide and drunk driving lead the causes of teenage deaths and the drug problem has reached the elementary grades. A picture emerges of human waste and a society despairing over its children and youth, and of a school system trying to respond by reshaping and reorganizing its established procedures and seeking to improve achievement by setting firmer requirements and higher standards. The need for bold new visions and fresh ideas is pervasive, yet reliance on the tried and familiar is difficult to overcome." (1)

Sobering as this summary is, consider the following from the National Alliance of Business: (2)

- * More than 1 million youth drop out of school every year, including those from some cities where the drop out rate is as high as 70% among some sub-populations.
- * The annual drop out rate contains enough people to cost in excess of \$240 billion in lost earnings and foregone taxes over their lifetimes.
- * The economic liability of drop outs exceeds \$130 billion in criminal justice system costs, public assistance and social services costs during a lifetime.

* The youth unemployment rate is triple the overall unemployment rate.

* The United States Department of Labor has indicated that the average high school graduate can expect five to eight careers over a lifetime, requiring continuous learning and re-training.

* The lifetime earnings of a college graduate is \$596,000 greater (in 1981 dollars) than a high school graduate.

* 23 million adults are functionally illiterate in American society. Another 47 million are borderline illiterate.

Combine the above with a summary from the Hudson Institute 1987 report on the "Workforce 2000" and the general trend looks difficult for both high school drop outs and their families, as well as for the local communities and the society at large. (3) Within the next twelve years:

* Manufacturing will decline with all of the new jobs and most of the new wealth coming from the service industries.

* New Jobs in service industries will demand much higher skill levels.

* The workforce will grow slowly, becoming older, more female, and more educationally and financially disadvantaged. (15% of the new entrants to the labor force will be native white males, compared to 47% in 1987).

* The population and the workforce will grow more slowly than at any time since the 1930's. Population growth in the fifties expanded at 1.9% per year and is expected to be .07% by 2000 A.D.. The labor force grew at a rate of 2.9% in the seventies to less than a projected 1% after 1990.

* The average age of the workforce and the population will rise, with a decline in young workers.

* Two thirds of all new workers will be women and 61% of all women of working age will be in the workforce.

* Minority participation in the labor pool will double, rising to 29% of the new entrants to the workforce.

* Not since 1917 will immigrants represent the largest proportion of new workers. 600,00 legal and illegal aliens are expected to enter the U.S. each year.

* The fastest-growing job categories will be in professional, technical and sales fields, requiring a postsecondary level of education.

These national trends which are particularly felt in cities like New York and rural areas of high unemployment, like Greenville, Iowa, must be considered in the "re-thinking" of and the re-structuring of the educational system to increase high school completion rates.

During the past five years, the public has been inundated with special reports and statistics, which have stated the problem in many different ways. However what is needed is not another restatement of the problem. Rather, a new direction in resolving the high school completion problem and the problem of deficient work skills is necessary if there is to be a next generation of the workforce.

There is reason for a new expectancy resulting from new research during the past fifteen to twenty years in a variety of distinctly different scientific areas of interest which have often not been included in the traditional paradigms of cognitive and behavioral psychological approaches to learning theory.

For example, new initiatives based on substantial research in "Learning Styles Theory," "Neurosciences," "Guided Imagery," "Transpersonal Psychology," "Accelerated Learning," "The Theory of Multiple Intelligences" and "Integrative Learning" offers a completely new conceptual framework in which the enhancement of human performance can take place.

In confirming the potential of new technologies in learning and teaching, the National Academy of Sciences reported favorably in December, 1987, that "Yes, there are promising methods beyond traditional approaches and these potentially valuable techniques should be fully investigated...." (4) The context of that quote was the formal release of the report, ENHANCING HUMAN PERFORMANCE, which was commissioned by the United States Army to examine "the scientific evidence available on a wide range of techniques intended to improve learning, memory, motor skills, group cohesion, and other components of human performance." (5) As positive as the report was, on the admission of the chief scientist, John Swets, the report was incomplete on several counts and further study is required for an explication of the current innovative approaches. (6)

AN OVERVIEW OF THEORY AND RESEARCH AND IMPLICATIONS FOR LEARNING

SECTION ONE - LEARNING STYLES THEORY

Although the "Learning Styles Theory" movement has gained most of its ground in the past twenty years, its origins can be traced to Swiss psychologist Carl Jung's brilliant book entitled Psychological Types which was published in 1921. In that book Professor Jung outlined the different ways in which people perceive the world around them and the various ways that people process information after it is "taken in." He wrote rather clinically about types or categories of people which are clearly predictive of their behavior in dealing with the world around them. Jung described four types of classification of people, all of whom could be identified as either "Feelers" or "Thinkers" or "Sensors" or "Intuitors."

It is not clear whether Jung was reacting against the "standardization" of intelligence testing, in much the same way that such a reaction is taking place in 1988. But it is rather ironic that only two decades earlier the French psychologist Binet was asked to design a test that could predict the achievement of children in the French schools. His success led to the popular use of the I.Q. test to determine the life chances of young people, military personnel and the general population until this day. Recently, that view of "intelligence" is being challenged and will be discussed below. The point to be made here is that until the past fifteen years, understanding people's performance in terms of Carl Jung's views or the more established instruments to determine "learning styles" has been ignored in Learning Theory, instructional methodology and curriculum design.

Even with the evolving views of learning styles theory, the assumption has continued in the learning styles research that intelligence is a uniform construct, measured in terms of quantitative, logical and linguistic performance. There are a variety of learning styles instruments on the market today which attempt to categorize the learning styles of individuals along a continuum of variables. All, however are based on self reported inventories of preference. Although substantially different in their attention to various factors, there are over a dozen popular inventories currently used in education, clinical practice and corporate training. (7)

There is a wealth of research, evaluation, articles and books available (8) for the reader to study ranging from validation studies of the instruments to second generation research on the success of student achievement under conditions of managing classrooms and training environments with "learning styles."

All of the instruments display that learners have different inclinations, attitudes and dispositions with respect to both the perception and the processing of information. All inventories give a profile which displays how people are likely to act and how they might best be counseled, taught, supervised and trained. It is clear from an emerging body of research (9) that learners of all ages will predictably react to a variety of experiences depending upon their dominant learning mode or "learning style."

Of the fifteen to twenty popular inventories, each has its own focus from matching learners to their styles (Dunn and Dunn), cycling learners through environments which employ each style in instruction (McCarthy); matching supervision strategies and instruction to the brain Hemisphere and Limbic System dominance profile (Herrman); managing parental behavior, teaching style and children's behavior in terms of differences in dominance patterns (Reckinger); and exploring culture and bi-cultural factors on learning (Hill; Ramirez)

With regard to these and several other "Learning Styles" inventories and projects related to the improvement of student achievement, the National Association of Supervision and Curriculum Development in conjunction with the Oklahoma State Department of Education sponsors (10) a newsletter and clearinghouse on "Learning and Teaching Styles and Brain Behavior." This organization is enlisting the participation of researchers, teachers, administrators and project leaders to study and develop this important area.

Also, on a solid research and scholarly scale, current published research from the Learning Styles Network which is a sponsored network of the National Association of Secondary School Principals and St. Johns University, under the outstanding leadership of Professor Rita Dunn, reveals the following:

1. "Individual responses to sound, light, temperature, body posture while concentrating, perceptual strengths, intake (of food), time-of-day energy levels, and mobility are biological, whereas sociological preferences, motivation, responsibility (conformity), and structure versus the need for options, are thought to be developmental." (11)

2. "Within each culture, socio-economic strata, or classroom there are as many differences as there are between groups." (12)

3. "Every human being has a learning style and every human being has strengths." (13)

4. "No Learning style is better -- or worse-- that any other style." (14)

5. "It is important to remember that, despite significant differences, all groups (cultural, academic, male/female) include all types of learning styles." (15)

6. "The majority of poor readers throughout the United States are global and boys; they do not learn easily by remembering the differences among sounds but are taught to read through phonics--an analytic auditory method.... The majority of children in need of speech therapy also appear to be boys, as are the majority of children classified as Learning Disabled. The majority of underachievers are tactile/kinesthetic; in addition, they are peer-motivated, require considerable mobility, prefer to structure tasks their way, and are not morning people...--characteristics to which most schools are unresponsive." (16)

These conclusions are based on studies from over sixty separate institutions around the United States and involve over one million young people.

Despite the great promise of "Learning Style Theory" and the very practical evidence of its potential as a clear strategy and technology to increase student achievement, there are important questions which require further research on the relationship of learning style to culture. The classical sociological work of scholars such as Durkheim, Marx, Weber and Worf suggest strong evidence about the cultural influence on perception and processing of information. How does this knowledge relate to the Learning styles equation?

Learning Styles Theory and Cultural Differences

Research conducted by Alayne Yates, M.D. on the current status and future direction of the Indian child corroborates the findings of many researchers who study the unique characteristics of acculturation into the Anglo educational system. Dr. Yates maintains that "American Indians are the most severely disadvantaged of any population within the United States. By adolescence, Indian children show higher rates of suicide, alcoholism, drug abuse, delinquency, and out-of-home placement. School achievement is compromised, and many youths drop out before graduation from high school. The Indian child understands the environment through intuitive, visual, and pictorial means, but success in the Anglo school is largely dependent on auditory processing, abstract conceptualization, and language skills. This difference compounds existing problems of poverty, dislocation, alienation, depression and intergenerational conflict and can partially account for the higher rate of emotional and behavioral problems among Indian adolescents." (17)

In summarizing a review of similar research on learning styles, Dr. Paul Messier, of the Office of Research at the United States Department of Education indicates that "... Reva Crawford, Boston Indian Council, Boston, Mass. and Domingo Rodriguez, Los Angeles Public Schools, Los Angeles, Ca. reveal that some population groups are characterized by a given learning style, i.e., a predominant or preferred mode of experiencing. Observations of certain low SES students in urban schools reveal coping and problem solving styles that differ from their more "advantaged" peers. Specifically, they are more likely than their more advantaged peers to approach problem solving intuitively, and to take the short-term, high risk, quick payoff gambles. Currently, there is a growing body of neurological evidence that these students exhibit a particular learning modality." (18)

The traditional school curriculum does not allow for anything beyond a linear, step-by-step approach to learning which often relies heavily on linguistic and quantitative strengths. The procedure relies on reasoning, sequencing, ordering, classifying and reducing to components and arriving at generalizations.

This conventional type of approach to perceiving and processing information is not intuitive and does not convey data through spatial or visual means. It pays little attention to the whole of anything or purpose, while elevating components, units and parts of a subject to be learned. For students who need to see the "big picture" or to see the "forest before the trees," traditional education inhibits learning, contributes to stress and leads to the flight which is measured in high school attrition rates.

Similar observations are discussed in studies among the Eskimo (19), Hopi Indian Children (20), and Pueblo (21) and Navajo (22), Chinese (23) and Japanese (24). In addition, research in learning preferences has been published in areas of neuroscientific interest including: Cerebral speech lateralization (25), Enhancement of the right field of vision (26), Differential Cerebral Involvement in perceiving language characters (27), Hemispheric specialization and Language (28), Cross cultural studies of Cognitive Development (29), and Right Brain Dominance among African American youth (30).

The call for research and for new policies to deal with different learning styles among various cultures is expressed by Dr. Yates in "The American Journal of Psychiatry," "An important and hitherto poorly understood source of acculturation stress is the differing cognitive style of American Indians. For centuries, the Indian people depended on the visual pathway." (31) This speaks for many cultures for which verbal, analytical and quantitative analysis is not as valued as spatial, rhythmic, metaphoric, visual, silence and meditation.

As a physician, Dr Yates prescribes an educational environment which could apply to most cultures which do not conform to the Euro-Centric model. About American Indians (and applicable to all children), he wrote that "Programs need to be developed to provide specialized aids to enhance the acquisition of language through developing diverse instructional approaches that combine visual, observational, and exploratory methods. These programs would also build an active, problem-solving approach to the acquisition of English.... Programs to maximize the inherent potential of the Indian child should emphasize strengths rather than weaknesses, building on the exceptional abilities of the Indian child by individualized programs to develop fine motor, classification, visual-spatial, and visual memory skills." (32)

The entire arena of investigation of learning styles in general and among specific cultures holds great promise of moving in a more accomodating, responsible and energetic vision of learning as a truly multi-cultural, multi-lingual and multi-dimensional opportunity. It presents a new view of learning as a cognitive catalyst among different styles, as opposed to the convential approach which is a cognitive deficit based model which measures differences against standard "bell curve" methods and goals.

SECTION TWO - NEUROSCIENCES AND THEIR CONTRIBUTION TO LEARNING THEORY

For purposes of this review, I have elected to incorporate in the following discussion of neuropsychology (the study of the mind) with neurosciences (the study of the brain), together with areas of specialization such as neurophysiology, neuroanatomy, and neurochemistry.

As a general caution it might be useful to recognize that although the location of certain mental functions, such as speech, has been associated with the left side of the brain since Egyptian medicine, it has only been in the past twenty-five years that medical scientists have come to understand the fundamentals of brain physiology, chemistry and function. Also the implications of neurosciences on learning are just now beginning to reveal themselves in pilot projects around the United States. Despite Nobel winning research and recent learning strategies, the surface has only been scratched.

This is the case, in part, because virtually no research funds have been made available to study the implications of new discoveries in science on the process of teaching and learning in the educational system. The entire subject is outside the conventional wisdom of traditional research agendas established by educational research policy.

Nevertheless, in many respects, the recent advances in knowledge of the brain parallel the advances in physics which have revolutionized science since the reversal of Newtonian physics and the incorporation of Quantum Mechanics and Relativity. Most recently, brilliant physicists such as England's Stephen Hawking are seeking to explain the origin of the universe by combining principles of Cosmology with principles of Molecular Theory. The result may mean a reconceptualization of science as dramatic as the shift from Copernicus to Galileo; from Newton to Einstein.

The analogy is twofold: first, the brain is as mysterious today, inviting different theories and questions for research as is our understanding of the universe and modern physics; and, second that the recently established research in neurosciences, and ongoing studies, may be as fundamentally provocative in enhancing our view of the learning process as understanding quantum mechanics and relativity provided a new model of physics. Consider that no one knew what an "endorphin" was prior to 1972 and it was only just 1982 when Roger Sperry won a Nobel Prize for his contribution to brain research through the proof that the brain functioned as two distinct and different entities when the nerve connection (The Great Commissure is the bridge of nerve fibres which connects the left and right hemispheres of the neocortex of the brain) was severed.

The human brain is one of the marvelous mysteries which recent science is beginning to unravel through "glimpses" and "insights" into its structure, organization and function. As an incomplete mystery, what has been learned offers a useful framework of hints and metaphors about understanding of human comprehension and learning theory. Among the neurosciences, there are few certainties which "unlock" a quick procedure for a new theory of learning. But what is clear is that no complete understanding of the learning process can be understood without a hand-in-hand relationship with neuroscience.

More importantly, as we recognize that of the more than one hundred billion cells and the untapped capacity of the brain (some estimates suggest that we use only about 5% of brain capacity), there exists an opportunity to look forward to human performance which is so vast and so varied that our expectancy of capacities and potential of EVERY person can be substantially elevated.

Understanding the relationship of brain and memory

One of the conditions under which teachers, principals, parents and trainers say that "Johnny didn't learn his times tables" or that "Suzie has an attention deficit disorder and can't seem to concentrate on her phonics" is that neither Johnny nor Suzie can remember enough to perform a prescribed task. Within education, memory is one of those things which is critical to learning, but is little understood is seldomly considered in the instructional process. The commonly held view is that "you either have a good memory or you do not."

Nestled within the great depths of the brain's mysteries is "memory." Memory has charmed and eluded us for centuries, giving rise to worship through the Greek goddess Mnemosyne and the plethora of memory courses to improve our mental performance. Scientists are not certain whether memory is just "stored in the brain" or is part of that complex fabric known as the immune system. With respect to localization in the brain, it is clear that in some sense memory is localized by certain functions. For example, a head injured patient with a left hemispheric injury might not remember vocabulary (aphasia) or be able to remember how to link ideas in a sequence (alogica), but can very well remember singing songs with words and harmony in sequence.

According to leading memory theorist and Professor of Psychology Douglas Herrmann, "While scientists cannot describe precisely what happens physically in the brain during memory processing, they have a fairly strong understanding of how memory may fail us. When memory fails, it does so in one of three ways. It can fail to register something initially in memory; it can fail to retain over time that which was successfully registered; or it can fail to remember something, despite successful registration and retention. The theory many psychologists advance assumes that memory performance is due to a system of several components, each with its own specific job to do. Much like a stereo or hi-fi system, each component of the memory system contributes to the overall functioning of the system." (33)

In his book Memory Improvement Techniques, Dr. Herrmann indicates that "A memory trace is registered according to a basic pattern. Information in the world around us is picked up by the senses and then transferred to working memory. From working memory, the information is absorbed into long-term memory. The remembering of a trace also occurs according to a basic pattern. After registration, comprehension of ideas related to the information stimulates the trace of the information in long-term memory. When the trace has been sufficiently stimulated, it emerges from long-term memory back into working memory." (34)

From a neurophysiological perspective, memory reception is tied to function. For example, verbal memory is processed auditorially through the left hemisphere of the neocortex, while spatial, visual memory is processed through the right hemisphere through visual cues. In addition, two tiny regions in the brain and within what is known as the limbic system, are responsible for moving information from short-term or working memory to long-term memory. The two organs are known as the Hippocampus and the amygdala.

As described by Ned Herrmann in his new book The Creative Brain, the hippocampus moves conceptual material into long-term storage while the amygdala facilitates emotional material into long-term memory. (35) If there is a joint function of the two working together - idea and emotion - it is easier to stimulate a memory trace and "to register", "to retain", and "to remember" things in an emotional context. This is why mnemonics strategies include improving your memory of names and formulas by visualizing an absurd picture that has an emotional upshot to it to enable the memory trace to be activated into long-term storage and easy retrieval. With this understanding of the process of memory of emotions, concepts and facts, it is questionable to teach in anything other than a positive emotional context.

Lateralization, Localization and Canalization of Brain Function

These concepts refer to the specific identification of brain function like verbalization, logical performance or visualization, with particular regions, localities or canals in the physical brain.

During 1936-1960 Dr. Wilder Penfield conducted delicate brain surgery on patients at McGill University in Montreal, Canada. As a neurosurgeon, Dr. Penfield conducted his surgery by administering a local anesthetic, allowing the patient to remain conscious. When various areas of the brain were stimulated with an electrical probe, reflex responses were elicited, including muscle twitches, sounds, smells, and emotions. This supported the view that memory was stored in localized regions of the brain.

What was most suprising to Dr. Penfield's research team was the consistent response from probes above the temporal lobe where very specific memories were recalled about incidents long forgotten or never before recalled. The minute detail of recollection was like a video replay available to the mind. This has led Dr. Penfield to conclude that every data element ever perceived at the conscious and sub-conscious level is imprinted in the brain in memory. (36)

The holographic brain - Dr. Karl Pribram

Although localization of function has been well established, there is a genuine ambiguity about particular functions and activities having special homes in areas of the brain. Karl Pribram, the father of neuroscience, advocates a Holographic Theory of Brain function. His research has indicated that although certain functions of the brain are stored in a region, in some sense that function seems to be interconnected in an integrated circuitry with the rest of the brain.

Children with a left hemispherectomy do develop speaking ability over time. The earlier the operation, the better the recovery. People with right hemisphere damage (where emotions are controlled) learn to control the mood swings associated with right hemisphere insult.

Pribram's model of the brain is that although there is clear evidence of dominance and localization of function, there is a sense in which all functions are accessible through different routes. His model was drawn from holographic photography which builds upon wave interference patterns from two laser beams focused upon an object. When two more laser beams are passed through the photographic plate, a three dimensional presentation of the object occurs. If you look squarely at the photographic plate, one can only see waves of light. If one were to cut the photographic plate in half, discarding one half, the entire object appears as before, but slightly degraded or fuzzy. Cut the half in half and, again, there is the three dimensional representation, but more blurred. (37)

According to Peter Kline in his exceptional book, The Everyday Genius, "This holographic view of the brain provides an interesting basis for critiquing other models of neurological organization.... However much certain functions may initially seem to be limited to particular areas of the brain, exceptions can usually be found; for every new theory of brain geography that emerges, critics arise to point out neurological anomalies occurring in large enough numbers that they seem to invalidate a given theory." (38)

In the light of such criticisms from reputable neuroanatomists, such as Jerre Levey and other educational theorists who churn as the oversimplification of "Left Brain - Right Brain" causation, it is useful to keep in mind that "whether or not these theories can be taken literally, as models they provide valuable insights for understanding the educational process." (39) Indeed, it is not as important to be concerned with lateralization or whether a specific function takes place in a particular part of the brain, as to understand that these functions do occur and there are possible ways of enhancing those functions in all of us. And it is toward that end that we should assess different models of Brain Theory.

The Triune Brain - Dr. Paul MacLean

The most useful "organic" model of brain function has been developed by Dr. Paul MacLean of the National Institute of Mental Health. This theory provides an evolutionary explanation of the development of the three layers of the brain over millions of years. In a way, the Triune Brain Theory views the operation of the brain like a gear box in a standard shift car. There is a continuous shifting between the layers of the brain, relative to the functions which are either sought or imposed. The oldest layer, the "reptilian" brain is located at the brain stem and rigidly controls the layer responsible for "life threatening" responses, vital functions and basic needs. It controls at an automatic level the "downshifting" into the reptilian brain in moments of perceived threat, stress and the "fight or flight" syndrome. Snakes have this type of brain and nothing more.

The next level to evolve in human development is the "Limbic System." Wrapped around the reptilian brain, the limbic system lies beneath the rational neocortex which is the third layer in the evolutionary stage. The limbic system, noted earlier, is the home of emotion and involved in accessing long term memory. It is also here where antibodies, endorphins and other peptides flow from the vital interaction of the three brains of the triune brain. A cat would exhibit the behavior associated with having both reptilian and limbic parts of its brain. Cats express emotion and one can tell when they want to go out, but there is no higher order conceptualization as is associated with the convoluted neocortex of humans.

The third level, split in two halves is the neocortex which is responsible for all of the outstanding functions which enable us to call ourselves humans. The left and right hemisphere of the neocortex interrelate to provide thinking and reasoning and verbal and visual communication. There is a symbiotic relation between the neocortex and the limbic system which seems to cause the rational neocortex to keep the emotional limbic system in check while the emotional limbic system feeds fuel to the passion for learning and thinking in the neocortex.

In The Republic, Plato described mental activity in the Analogy of the Charioteer as a driver with two horses, one white and one black. The driver (neocortex) held reins on the lead white horse (limbic system) and the power black horse (reptilian). Freud also offered the construct of the Ego, Super ego and Id which, long before neuroscience described a pattern of mental activity which is distinct, different and identifiable.

In so many cases, from Greek Stoicism to American Puritanism, emotions were thought to cloud reason and drain "pure" reason from its clarity. However, with an understanding of the interplay of the triune brain, where positive emotion affects long term memory and the interplay of the neocortex with the limbic system facilitates hardiness. We can grasp why so many geniuses wrote about the passion of discovery and the joy of learning. We can appreciate also the agony of the high school drop out who internalized "failure." Moreover, where the fear of vulnerability and stress monitored by the reptilian brain causes withdrawal, flight and a freeze on neocortical functioning.

Separation of "thinking" from "feeling" and the polarization between conceptualization and emotion produces tension, stress and conflict in the operation of the brain. This leads to a kind of aloofness about learning as "unreal" and an uncontrollable emotional irrationality which yields frustration, anxiety and the desire to flee or fight.

Throughout the ages, theologians, philosophers, mathematicians and scientists have written about the "passion" of thinking. If schools and training environments are devoid of emotion, stale of passion for thinking, then the learners are cheated from the possibility of optimal brain functioning in accordance with Dr. MacLean's important theory.

Learning Theory which incorporates a comfortable interplay between the intellectual and emotional functions of human beings structures the opportunity to provide a natural framework for optimal learning. When positive emotions and joy are brought into the rational process, downshifting to the reptilian brain does not take place. The sullen, bored and anxious student who seeks to flee from school can be an obsolete experience in an enlightened school. If "down shifting" has become a habit, it is still possible to regain access to limbic and neocortical functions through sufficient relaxation and joyful environments. In the medical and therapeutic environment, this is what Dr. Herbert Benson refers to as the "relaxation response" which has been responsible for the medical recovery in patients.

The Split Brain - Dr. Roger Sperry

Focusing specifically on the neocortex, the "Split Brain Theory" won a Nobel Prize for its author, Dr. Roger Sperry. Dr. Sperry wrote that "The body plan of the mammal provides for two lungs, two kidneys, and paired organs such as eyes, ears and limbs. In a sense it also provides for a paired brain." (40) In attempting to solve the problem of chronic epilepsy, Dr Sperry and his research team severed the connection between the two halves of the brain known as the Corpus Collosum or "The Great Commissure." His studies showed conclusively that each brain half functioned independently from the other, after the operation. It was as if there were two people not communicating with one another inside one skull.

Consequently, the right side of the brain, which understands music, could not interpret language and the left hemisphere, which understands verbal cues, could not comprehend spatial information. Having lost the interconnectedness, the two halves of the brain developed compensation strategies and different personalities.

Through the use of experimental techniques which enabled him to communicate with each hemisphere, Dr. Sperry discovered the areas of both localization and speciality of the hemispheres. The Left hemisphere is dominant in logical, sequencing, linearity, verbal language, quantitative reasoning and reductionism. The right hemisphere was identified to be responsible for imagination, visualization, spatial conceptualization, intuition, music and rhythm, creativity, globality and generalization. The left hemisphere operates in a process of breaking things down into a step-by-step fashion which acts on logic and language. The right hemisphere synthesizes information, creates maps of information for visual memory and explores relationships in general concepts and archetypes. While relating emotions much more easily than the left hemisphere, the right hemisphere is also the seat of musical intelligence.

Subsequent research by several neuroscientists have corroborated Sperry's findings, while social scientists, psychiatrists and cultural anthropologists have conducted pilot research and written extensively on such topics as "Tachistoscopic Recognition, Handedness and Cerebral Dominance" by M.P. Bryden (41); "Cerebral Lateralization, Biological Mechanisms, Associations and Pathology" by N. Geschwind (42); "Hemispheric Specialization and Language: An EEG Study of Hopi Children" by L. Rogers (43); "Holistic Learning - A must with American Indian Students" by P. Wallis (44); "Problem Solving Strategies and Manifest Brain Asymmetry" by Webster and Thurber (45) and, finally, Gloria McLendon's "Exploring the Research concerning Left Hemisphere/Right Hemisphere Cognitive processes and examining one instructional technique which may be implemented across the curriculum to produce holistic thinkers" (46).

The Environmentally Enriched Brain - Drs. Rosenzweig and Diamond

The biological psychologist, Mark Rosenzweig and Neuroanatomist Marion C. Diamond (who conducted post mortem research on Einstein's brain tissue) have made startling contributions to the science of the brain in relation to learning. Although their work has been with rats, gerbils, squirrels and monkeys, the research holds unusual and exceptional promise for enhancing human mental performance, as well as in facilitating increased hardiness.

The results of the work of these two scientists has been so startling that their conclusions, repeated with scientific accuracy, have literally shocked the world of science. There are three stages to this discussion:

First, in working with rats, a biologist at the University of California in the 1920s noticed that some rats ran the mazes better than others. Consequently, he bred "maze bright" rats and "maze dull" rats. Forty years later, after generations and generations of experiments, Mark Rosenzweig and his team explored the relationship between brain chemistry and learning. Their basic question was that "If some rats run mazes better than others, is there a difference in brain chemistry?" In a broader context, they were interested in determining whether different learning environments and varying mental activity would constitute a change in brain chemistry. They hypothesized that learning and memory and problem solving activities mental activity would result in higher levels of brain enzyme Acetylcholinesterase (AChE) in the cerebral cortex or "thinking cap."

They created standard environments (standard cage, three rats to a wire mesh cage with usual nourishment), impoverished environments (isolated rats in a cage with three opaque walls, little stimulation, separation from other rats, no noise and dim light), and enriched environments (play groups of ten to twelve rats, large well lighted cage with swings, slides, ladders, bridges, toys, frequently changing stimuli and shifts in the environment).

They studied both "maze bright" rats in rich and poor environments and "maze dull" rats in rich and poor environments, as well as studying both in standard environment. The conclusion was emphatically that in all cases, there were higher levels of AChE activity in the cerebral cortex of the brain in rats raised in the enriched environment as opposed to either of those raised in standard or impoverished cages. Regardless of genetic background, increases in AChE were significant. Since the cortex is the layer of outer material, the grey matter where problem solving and higher order mental processing occurs, Rosenzweig concluded, "Rather than cortical AChE activity being a fixed individual characteristic, as we had supposed, it could apparently be altered by experience." (47)

The next step was an accident. Since the experiments required that in order to determine the AChE activity, it was weighed in tissue. To the amazement of the team and other neuroscientists not only had the AChE activity increased in the cortex of the rats in enriched environments, but also the brain weight increased. The stimulation of enriched environments had caused brains to grow. This was particularly startling in view of the traditional paradigm which held that regardless of brain activity, brain weight and structure remain stable.

The third step involved the inclusion of a renowned Neuroanatomist. Marion C. Diamond, famous for her work in establishing that Einstein's brain was much heavier in Glial cells than ordinary people and that the ratio of Glial cells to neurons indicates superior mental capacity, joined the team to ward off the onslaught of skepticism about the increase of AChE activity and the increase in brain weight.

She found conclusively that rats in enriched environments revealed: (48)

1. increased thickness in the cerebral cortex
2. 15% increase in size of neurons in the cortex
3. increases in protein in the brain corresponding to weight
4. increases in the amount of dendritic branching
5. increases in the number of dendrite spines per unit length
6. increases in the number of synapses and size of synapse
7. increases in the ratio of cortical size to the rest of brain
8. 15% increase in the number of glial cells in the cortex

Not only was such substantial growth possible and proven, but Dr. Diamond suggested that these sorts of results could be easily obtained in relatively short periods of time when we consider the studies of Rosenzweig and Diamond in light of our understanding of the neocortex and our view of human intelligence it becomes morally compelling to determine how increased mental stimulation, sensory experience and "enriched environments" with multi modal dimensions can be employed to enhance the brain functions and intelligence of people through the learning process.

SECTION THREE - GUIDED IMAGERY THEORY AND ITS RELATION TO LEARNING THEORY

Dr. Anees Sheikh, Chairman of the Psychology Department at Marquette University is one of this nation's leading scholar's of the Theory of Guided Imagery as a vehicle for the enhancement of mental activity in education, medicine and therapy. In his book, Imagery in Education, Dr. Sheikh assembles the thinking of several scholars who convey their research and beliefs about the importance of reviving and systematically renewing visual and guided "imagery." Currently, for the most part, guided imagery does not exist formally within teacher education curriculum and usually the limited visualization which takes place is either on the playground or in the athletic program. "Pay Attention" and "Stop Daydreaming" and the Jack Webbian "Just the facts ma'm, just the facts" are symbolic of a thorough misunderstanding of the operation of the creative brain.

That absence of knowledge and misunderstanding does not surface from maliciousness, but rather permeates our educational system as a cultural bias which has its roots in the Protestant Reformation. According to Dr. Sheikh, "The faculty of fantasy and imagination was held in high esteem in the West until the Renaissance. Then a dramatic re-evaluation took place, and imagery was relegated to obscurity - where it remained until the 1960's, when a new and equally dramatic re-evaluation occurred." (49)

Only recently has the area of mental imagery been resurrected for scientific enquiry. It was buried in the Renaissance for many reasons. Protestant Reformationist Peter Ramus (1515-1572) can be credited with the demise of visual imagery from the process of communication and learning in Western Culture. As the age of reason emerged, Ramus developed a revolutionary system of education for the french schools which was tied to verbal memorization and linguistic performance. He shifted away from the Greek and Roman "pagan" strategies of oral traditions and myths with visual metaphor and developed a memory system which replaced mental images and was based on a heirarchical system of vocabulary which spread throughout Europe. The relatively new "printing press" provided a technological vehicle for the general diffusion of this "print" based linguistic strategy for memory and learning. From a neurological viewpoint, a shift occurred from right hemispheric visual memory to left hemispheric verbal memory.

Through Ramus's work, a major shift away from the scholastics occurred. The scholastics used Imagery, metaphor and analogy as a part of Prudence and the creative process. Imagery was also used in the teaching a learning process about religious concepts and rituals. (Under this view, gargoyls served as visual images of the existence of satan and evil, as opposed to the more popular belief about their influence as relics of paganism and the occult.) Ramus swept away imagery as arbitrary, deceitful and capricious and replaced the process of teaching, remembering and learning with a linguistic dialectic-classification system of translating learning and retention to verbal processing.

That system evolved to its current status which is exemplified in the standard I.Q. tests, Scholastic Achievement Examination, State Boards of Education Examinations and Standard performance examinations of all types throughout most of the professions.

A fresh approach has been gaining momentum in the past twenty-five years which challenges the wisdom of relying on a verbal mnemonic system for cognitive development. In part this movement has been encouraged by the recent research in neuroscience in general and the "Split Brain Theory" in particular.

According to the late Professor Beverly-Colleene Galyean, "Influenced by advances in medical, biomedical, neurophysiological, and psychological research pointing to the desirable effects on physical, emotional and mental performance, some educators were quick to study and utilize adaptations of these techniques (Guided Imagery) in their respective education settings. A review of the literature related to affective/holistic education reveals that educators ordinarily use visualization and guided imagery activities in one or more of four ways:

1. They employ it as a means of relaxing, centering and sharpening perception, thereby preparing individuals for the learning task at hand.
2. They use it for teaching basic subject matter. This is referred to as "guided cognitive imagery."
3. They see imagery as a vehicle for affective development, such as the increased awareness of inner senses and feelings and the expression of these wherever appropriate, expanded inner cognizance of personal images and symbols, introspective means to conflict resolution, culling feelings of self-love and appreciation, strengthening one's personal values schema and belief systems, and bonding with others. This is called "guided affective imagery."
4. They utilize imagery as a means of recognizing and working with altered states of consciousness, experiencing energies beyond the normal field of awakened consciousness, probing the spiritual, mystical and transcendental aspects of life, experiencing concepts such as unity of being, oneness, wisdom, beauty, joy, love and self. This is labelled "guided transpersonal imagery."

These four types of imagery techniques often encompass health producing or health-maintaining activities, such as deep breathing, stress-reducing visualizations, sensory awareness, positive-though producing and/or pleasurable memories, psychophysical visualizations and covert rehearsal strategies. These activities are being recommended by a growing number of health professionals in hopes that individuals will become increasingly more responsible for managing their own health care." (50)

Because of its association with right hemisphere performance, guided imagery becomes a conduit through which to achieve greater interaction, synchronicity or "wholeness" of brain performance. This has been attributed to combining the divergent right hemisphere(creativity) with the convergent left hemisphere(problem solving) in increasing health, well being and hardiness.

The world of creativity, imagination, intuition and insight has been a necessary condition to all advances in human thought. Literature, history, anthropology and psychology are replete with accounts of "visions" which have given new paradigms and new models through which to understand human relations and the outer world. But in no area of human intellectual activity has the concept of "image" and "visual thinking" been more prominently expressed than in science by the scientific geniuses themselves.

When Albert Einstein reformed electromagnetic theory, he began in his famous Gedanken experiment in which he IMAGINED himself traveling on a beam of light at nearly 200,000 miles per second. It was through that fantasy or imaginery perception of reality that a new concept of science was born. When Einstein spoke about his abilities, he said that he rarely thought in words, but rather in "visualizing...effects, consequences , and possibilities." (51) Einstein also claimed that his unique ability did not lie in mathematical formulation, but that: "Words or language do not seem to play any role in my mechanizm of thought. The physical entities which seem to serve as elements in thought are certain signs and more or less clear images. (52)

In J.C. Gowan's important article "The Production of Creativity Through the Right Hemisphere Imagery," he claims that "Right hemisphere(of the neocortex of the brain)is the vehicle through which incubation produces creativity. In his famous paradigm of creative process, Graham Wallas (1926) identified four components: preparation, incubation, illumination, verification. By incubation, he meant any technique of relaxation of the conscious cognition(left hemisphere function), such as, but not confined to dreams, daydreams, fantasy, hypnosis, meditation, diversion, play, etc., which allows subliminal processes (right hemisphere functions) to operate. He saw preparation (academic discipline), as the necessary, and incubation (relaxation), as the sufficient condition for creative insights to emerge. (54)

What this means in pragmatic terms for both creativity and learning within education is suggested by Dr. Galyean in her summary of recent research on Imagery, learning and behavior:

"Elligett, Danielson, and Holland reported increases in fifth-grade students' self-esteem and academic achievement as indicated by improved test-taking skills. Shaw found increases in creative and divergent thinking in high I.Q. students. Lange discovered that elementary-school and secondary-school learning-disabled students learned more of the material presented in their science classes, were more highly motivated to learn material, and showed more creativity than comparison groups. A secondary effect was that they appeared calmer and more ready to work than comparison groups. Piccolo and Render reported gains in reading achievement of high-school students. Groff and Render found gains in social-studies achievement of fourth graders. Boyle and Render reported higher scores in creative thinking among seventh graders. Galyean found decreases in frequencies of disruptive behaviors among high-school remedial-English students. She also reported that visualization and guided imagery combined with a variety of other affective holistic language-learning activities helped primary-school language deficient children to increase their proficiency in oral and written communication skills, and high school foreign-language students to increase their proficiency in oral and written composition skills. Toomim found that visualization and guided-imagery activities combined with various stress-reducing techniques helped elementary-school children perform better academically, reduce physical and emotional tension, improve test-taking skills, handwriting skills, I.Q.; and learning disabled students improved in reading recognition, comprehension, and spelling. Schuster and Martin, combining imagery with biofeedback, found gains among college students in the learning of rare words. Edwards reported gains in creativity among fifth, eighth, and ninth graders. Steingart and Glock claimed that reading skills of college students improve with the addition of imagery exercises to the passages being read."(55)

Although further research is needed in a variety of areas, the general consensus among those who are theoreticians and practitioners of Guided Imagery in education is that students who experience learning with visualization techniques are more attentive and less distracted, perform better on standard tests, are more involved in their work, learn more of the material taught, create more through their own imaginative talents, enjoy learning and school, do more original work, writing and organization, get along better with classmates and teachers, are more kind to one another, are more relaxed and confident.

SECTION FOUR - TRANSPERSONAL PSYCHOLOGY AND LEARNING THEORY

I chose to include a discussion of Transpersonal Psychology for several reasons, not the least of which is that it includes all of the phenomena related to human learning as opposed to traditional academic psychology which ignores much of human experience. According to Roberts and Clark, "Freudian, behavioral and humanistic psychologies are seen as useful, but incomplete psychologies. Transpersonal psychology offers a more inclusive vision of human potential, suggesting both a new image of man and a new world view. Using transpersonal psychology in education does not require a complete rejection of established educational psychologies, but may be used in conjunction with them. Conflicts occur at some points, and agreement occurs at others." (57)

However, traditional psychology prevails in establishing the research agendas for educational policy and investigation. The general lack of nation-wide support for research and pilot projects about the important questions raised in the areas of transpersonal psychology is not unusual during any paradigm shift. Max Planck, a great physicist who established the principles upon which Einstein drew, once said that science advances, "funeral after funeral." Perhaps in the case of the contribution which transpersonal holds hope for in learning theory, there need not be casualties. Nevertheless, without the support for research, project development and implementation, the casualties of wasted human talent might well continue to mount up in the form of drop outs, drug abuse, imprisonment and economic and personal despair.

The underlying presupposition of transpersonal psychology is that there is a unity of interrelation between the physical, emotional, intellectual and spiritual life. This view runs counter to traditional perspectives which seek to explain phenomena in terms of a reductionist formula seeking to compartmentalize reality. Consequently, the optimal educational system or learning environment will nurture the emotional, strengthen the hardiness of the physical, expand the capacity of the rational, enhance the intuitive, develop the practical, foster the creative and stimulate the multiplicity of perceptual processes available to each person. The focus of transpersonal psychology is on both the human potential for self-actualization and the human desire for self-transcendence and self-realization. Fundamentally it is concerned with the optimal development and utilization of consciousness at every level.

The brain functions at different electromagnetic frequencies which are measured by resonance of the brain's electrical waves in cycles per second and are commonly referred to as: Beta (13-30 Herz) - this is the active brain, with concentration and excited attention; Alpha (8-12 Hertz)- is a conscious, calm and peaceful reverie of relaxation; Theta(4-7 Hertz)- this is the dreary, drowsy near sleep state of consciousness; and, Delta (.5-3 Hertz) -sound sleep. These different levels of consciousness or states of brain function are measured by a process known as electroencephalography or EEG. This is a mapping of mental activity as measured by brain waves.

Different states appear to be associated with specific tasks. Beta produces high levels of concentration for completing a task in writing or math, while Alpha states are associated with imagination, creativity, and originality.

Most conventional education, primarily because of traditional approaches to learning as linguistic, verbal, math and logical exercises(ergo Peter Ramus), is devoid of the special inventive, entrepreneurial and creative processes associated with Alpha states which are best accomplished, according to existing research, through guided imagery and visualization.

As the Theory of Guided Imagery evolves and as additional research shows the relationship and contribution to educational theory. as well as to improved personal performance and creativity, we might all come to a greater appreciation of Professor Ferguson's comments in Science, 1977:

"Many features and qualities of the objects that a technologist thinks about cannot be reduced to unambiguous verbal descriptions; they are dealt with in his mind by a visual, nonverbal process. His mind's eye is a well developed organ that not only reviews the contents of his visual memory, but also forms such new or modified images as his thoughts require. It is nonverbal thinking, by and large, that has fixed the outlines and filled in the details of our material surroundings.... Pyramids, cathedrals, and rockets exist not because of geometry, theory of structures or thermodynamics, but because they were first a picture - literally a vision - in the minds of those who built them." (56)

How much further can a child go if that process is neither stymied by a narrow focus of learning nor left to happenstance?

"Most topics being investigated by transpersonal psychologists consist of the psychological aspects of at least one of the following: a new image of man and a new world view, altered states of consciousness (including meditation, dreams, etc.), impulses toward higher states (such as peak experiences), self-realization and self-transcendence, subjective experience and inner states, spiritual growth, parapsychology and psychic phenomena, other cultures and their psychologies (especially Eastern psychologies), newly discovered forms of energy, recent physiological research (such as voluntary control of internal states), and evolving consciousness." (58)

As mentioned earlier in this discussion, many clinical and educational psychologists and neuroscientists believe that human performance is operating at less than 5% of capacity. It is the specific goal of transpersonal psychology to study and develop those avenues to talent and resources to expand human performance well beyond current status.

Transpersonal psychology is leading psychology through a paradigm shift about human nature. That view is an expanded concept about the capacity of humans to actively operate in a significant number of modalities and patterns with varying "states of consciousness" well beyond the traditional view that mental performance is restricted to "beta" states.

Consequently, transpersonal psychology draws upon many different resources of Learning styles, neurosciences and guided imagery, as well as other areas which affect health and mental states, such as psycho-immunology, an area of tremendous value for its potential in enabling people to influence physiologic states in preventing or curbing disease.

The importance transpersonal psychology seems to present to education is as significant as the work of Rosenzweig and Diamond in studying the environmental effects on brain chemistry, structure and growth. Indeed, as Roberts announced in 1985, "changes implied by consciousness studies are so fundamental that they make current education look like a holdover from medieval times. Institutions of teacher education are using outdated learning principles based on outdated, pre-state-of-consciousness models of the human mind." (59)

Advances in research emanating from the Foundation for Brain and Mind Research under the leadership of Jean Houston and Robert Masters have set forth a framework for research, instruction and curriculum. Professor Carol Flake has contributed to the implementation of these principles to the grassroots of education; namely, the classroom teacher. She describes the learning principles, transmitted through a transpersonal psychological view of education, which she employs in her curriculum development training for teachers (many of these principles reflect the thinking of theorists such as Steiner, Montessori, Piaget, Dewey, Froebel, Mercado and Howard Gardner):

- 1...A multisensory approach is important because perception lays the foundation for cognition.
- 2...Learning should proceed from the concrete to the abstract
- 3...Because the brain attempts to make sense out of incoming stimuli, learning occurs best when the curriculum is integrated.
- 4...A systems approach should be followed that emphasizes physical, mental, emotional and spiritual development
- 5...Motor learning forms the basis for concept development.
- 6...When threatened, people automatically shift control of behavior from the cognitive portions of the brain(neocortex) to the reptilian brain, which dictates the fight or flight response(MacClean, 1978).
- 7...People learn differently; learning in one modality (e.g. kinesthetic)can be bridged to another modality (e.g. verbal).
- 8...Left(i.e.,verbal, analytical) and right(i.e.,imagistic, holistic)brain functions should be involved in the learning experience.
- 9...Thinking in images is faster than thinking in words, and this ability can be taught through such techniques as cognitive guided imagery.
- 10..Humans can be taught how to gain access to a variety of states of consciousness to increase their range of skills and abilities. (60)

I would add to this list a focus on the development of mental states and mental activity which can control stress, blood pressure, antibodies in the immune system and focused disease prevention.

Evident in the discussion above is the obvious inclusion of a wide range of theories from traditionally unrelated disciplines and, heretofore, "frivolous" or "irrational" areas of interest. Transpersonal psychology is an attempt to make sense out of the elevation of human learning through a synthesis of this myriad of influences on learning processes. And in particular, it does so by extracting those insights about a greater understanding of the processes from "within" the inner being.

According to Dr. Robert Ornstein, "...Psychologists are now returning to the essential questions of our discipline: How does the mind work? What are the major dimensions of human consciousness? Is consciousness individual or cosmic? What means are there to extend human consciousness? These questions have not had full treatment within academic science, having been ruled out of inquiry by the dominant paradigm for the past 60 years." (61)

As the paradigm shifts, toward a scientific study of neuropsychology and neuroscience, with its interaction with Philosophy of Education, there appears to be good reason to anticipate the improvement of learning theory and strategies which can accelerate and enrich the learning experience through these "advanced learning technologies."

SECTION FIVE - SUGGESTOPEDIA - DR. GEORGI LOZANOV

As a young student in Bulgaria, Georgi Lozanov became fascinated with the power of hypnosis as a result of a school project he conducted with his classmates and teacher. He realized the potential power of mental performance at the seemingly "unconscious" level. After becoming a physician and then a psychiatrist, Lozanov established the Lozanov Institute in the politically repressive communist country. His work with patients in therapy convinced him that hypnosis was a key to recovery and mental health. However the patient required an inordinately high reliance on the therapist which does not facilitate the ultimate goal of independence and self reliance.

In addition to his medical degree, Dr. Lozanov obtained his Ph.D. in psychology with a special interest in hypermnnesia - the phenomena of photographic memory. In his studies, he worked with many different people who had extraordinary memory and unusual mental powers.

Out of this life of enquiry into the development of super-ordinary mental performance, Dr. Lozanov developed a system for learning which is now in daily use in schools throughout the world, but in general isolation of the traditional systems of learning. Nevertheless, the principles of "Suggestopedia" have remained relatively uniform, regardless of the translation into different cultures. I believe this is because Lozanov's method most closely resembles the natural process of mental phenomena from a neurological perspective, as opposed to a cultural view. (62)

"Suggestology" - is the name Lozanov created for the study of the process and influence of suggestion on our lives (It is not known if Madison Avenue studied at the Lozanov Institute. Derived from Suggestology, "Suggestopedia" was developed as an instructional system built upon a set of learning principles which enable students to learn faster, in greater depth and with much more ease than was thought possible.

Lozanov defined three essential concepts to his learning system: Decoding, Concert Session and Elaboration. In his system each stage is utilized in every lesson and is structured sequentially. The first stage is the "decoding" sequence. The teacher introduces key concepts, words and/or ideas and dramatizes them through a "fun like" mime activity or charades game. The object is to give the students an opportunity to guess or discover the meaning of the concept, word or idea presented. This brief decoding process is not intended to teach the material, but is structured to familiarize the student with the framework.

The second stage is the "Concert session". With instrumental classical music in the background (6-9 Herz) this second stage is designed to help students both synthesize material and embed it in to the long-term memory. This process has been demonstrated in several different studies to introduce new material quickly and

with greater motivation, enthusiasm and joy.

The third step is the "Elaboration" stage in the cycle of learning. In the ordinary course of instruction, this is a lengthier process, involving discussion, skits, dramatization, songs and other activities designed to practice the use of material. According to Peer Kline, "It replaces the dull, routine drill and rote memorization standard in most classrooms. It makes it entertaining and easy to review the material in a number of different ways, removing almost all stress and strain from the learning process. Of course, the same activities would not be as much fun if a concert session didn't precede them. Half the fun is discovering how the right answers pop into the mind almost magically." (67) This is a system which elicits a "deja vue" response and the "ahah!" response among students in learning when what one comes to understand has roots of familiarity.

Fundamental to the Lozanov system are major differences from traditional learning which include: Use of the arts; A relaxed environment; open communicative dialogues; the belief that learning is a risk free and easy activity; the competence of the instructor in Lozanov learning principles; Credibility of the instructor and delayed correction techniques.

Suggestopedia has been used and validated to be successful for a variety of subjects, levels of instruction and ages of learners. Within the United States pockets of development are taking place under the more popular name of Accelerated Learning, Superlearning and Suggestive-Accelerated Learning. Despite the several pilot initiatives, the educational establishment, to the degree that it is aware, considers this movement an experiment.

Arising out of the medical tradition through the pathway of therapy, "Suggestology" and Suggestopedia" hold great promise in contributing to the establishment of classrooms in which the goals of transpersonal psychology, guided imagery, neurosciences and learning styles theory can be further researched and achieved.

concepts of the lesson or the most significant material to be learned, regardless of whether one is learning a foreign language, physics, algebra or english grammar. And it matters not at what level in the education system one is applying this approach.

According to the person most responsible for applying Suggestopedia to the general education curriculum in the United States Peter Kline states that the voice should be coordinated with the musical structure of a baroque, classical or romantic piece of music, so the words follow the musical score, the rhythms and emotional qualities of the piece. Two good examples of this are recordings of Prokofiev's "Peter and the Wolf" and Benjamin Britten's "A Children's Guide to the Orchestra", noticing how the reader's voice interweaves with the music. When speech and music interact, it is as if the speaker has become an instrument in the orchestra. Thus, a concert session is an artistic process that allows one to make a piece of music into a concerto for voice. Even though the voice utters not a note of the actual music it appears to have become a part of the orchestra itself. (63)

Students have a copy of the reading in front of them and can read along or simply listen. The subliminal learning which takes place provides a foundation for the accelerated learning of substantially more material than in traditional classrooms.

When the concert session is used in classrooms, much less time is needed to be spent on review, drill, practice and memorization. "Lozanov has asserted that when properly used, the concert session can do 60% of the classwork in about 5% of the class time. It is this element of his work that most clearly distinguishes his contribution from those of other educators, for he was able to accomplish far more in his classrooms than many other innovative educators who did not know about this powerful gateway to the long-term memory. (64)

Although there are outstanding positive studies published through SALT (Society for Accelerated Learning and Teaching, Ames, Iowa.) Paul Eggars reports that "At Iowa State University and the University of Toronto, instructors swear by it - their students reportedly picked up a semester's worth of Spanish in two intensive weeks. After two months, beginning French language students at Penn State had a higher average on verbal exams than traditional classes had after three months. In Washington, D.C. administrators at one high school are so impressed with the methodology that they have converted all subjects over to a Suggestopedia-based curriculum." (65)

Perhaps Lozanov anticipated the most recent work of French physician Tamatis who, along with American researcher Don Campbell states that "Music is not a frill. It can actually orchestrate the way we learn. It organizes patterns of vibrations in sound and movement. I don't agree that children should be taught to read at an extremely young age. We need to develop a child's imagination first with images, storytelling, myths, imitation, patterned breathing and relaxed movement." (66) In this way we create

SECTION SIX - THE THEORY OF MULTIPLE INTELLIGENCES -
DR. HOWARD GARDNER

Virtually every theory and perspective which has been discussed in the previous sections assumed the traditional view of "intelligence" as a phenomena of mental activity measured by linguistic, mathematical and logical performance. As mentioned earlier, when French psychologist Alfred Binet developed a paper-pencil instrument which predicted academic achievement in the children in the primary schools in Paris, there was launched a new view of intelligence and a new tool to discriminate between those who would succeed in school and those who would have difficulty; between the smart and the dull.

Educational systems around the world have operated and continue to function under the unfounded assumption of this view of intelligence as a single property or faculty of the mind. Students are tracked, labelled, categorized, evaluated, demeaned, envied, despised, promoted, denied, selected and rejected all along the lines of the I.Q. and its derivatives such as the S.A.T. Examination.

This single view of intelligence has also led to the construction of schools and curriculum and teacher education programs which parallel the uniformity presupposed in the traditional view of intelligence. In this one-dimensional view of intelligence and school, "there is a core curriculum, and set of facts that everybody should know, and very few electives. The better students, perhaps those with higher I.Q.s, are allowed to take courses that call upon critical thinking, calculation, and thinking skills. In the "uniform school" there are regular assessments, using paper and pencil instruments, of the I.Q. or S.A.T. variety. They yield reliable rankings of people; the best and the brightest get into the better colleges, and perhaps-but only perhaps-they will also get better rankings in life." (68)

This is Howard Gardner's analysis of the traditional view of single dimension intelligence and the "uniform" school which is entrenched in traditional educational policy and practice despite evidence during this century from a wide variety of researchers to suggest that because people learn differently (Carl Jung's personality types), their might be different "Intelligences." The notion of several intelligences an old debate. Plato wrote about Theoretical and Practical Intelligence, while ordinary people laughed at the father of Philosophy, Thales, as he walked around falling into wells, while gazing at the stars. They understood how someone could have wisdom and still be foolishly unaware of surroundings.

Dr. Gardner and a team of researchers at Harvard combined to clarify "human potential" and, in its pursuit addressed the central question: "What is Intelligence?"

Project ZERO as it became known was the project which explored answers to this question. Like Descartes before them, the team came to the conclusion very early on that there was not much known about "intelligence" and that a "zero" starting point was required. While Descartes doubted the existence of everything except his doubting self, Project Zero research rejected all views of intelligence and began anew.

In Frames of Mind: The Theory of Multiple Intelligences, Professor Gardner indicates that in writing this book, "I sought to undermine the common notion of intelligence as a general capacity or potential which every human being possesses to a greater or lesser extent. At the same time, I also questioned the assumption that intelligence, however defined, can be measured by standardized verbal instruments, such as short-answer, paper-and-pencil tests. At the time of writing, I had not fully appreciated the extent to which these conceptions of intelligence and intelligence testing are entrenched in our society. Perhaps this entrenchment helps to explain why many readers have not fully appreciated the nature of my challenge." (69)

And challenge it is, for the implications of Gardner's Theory of Multiple Intelligences attacks the old paradigm of the schooling process. But is more than dissatisfaction with the concept of I.Q. or with narrow views of intelligence; those objections have been clearly articulated by scholars like Thurston and Guilford. However, from Gardner's perspective the need for criticism is overshadowed by the evidence which calls for the replacement of the traditional view of intelligence altogether.

Toward that end, the construction of a new view, Professor Gardner builds a compelling case, based on his research in neurology, for a pluralistic view of intelligences. He identifies a neurological basis for establishing seven separate and distinct intelligences, which fulfill the criteria for "intelligence:"

1. Linguistic Intelligence- sensitivity to language, meanings and the relations among words. Commonly found in the novelist, poet, copywriter, scriptwriter, editor, magazine writer, reporter, public relations director, speechwriter.

2. Logical - Mathematical Intelligence constitutes abstract thought, precision, counting, organization, logical structure. Found in the mathematician, scientist, engineer, animal tracker, police investigator, lawyer and accountant.

These two above intelligences have been the sum and total of the traditional view of intelligence, vis a vis Binet.

3. Musical Intelligence - the sensitivity to pitch, rhythm, timbre, the emotional power and complex organization of music. This is found in the performer, composer, conductor, musical audience, recording engineer, maker of musical instruments.

4. Spatial - this is keen observation, visual thinking, mental images, metaphor, a sense of the whole gestalt. Found in architects, painters, sculptors, navigators, chess players, naturalists, theoretical physicists, battlefield strategists.

5. Bodily - Kinesthetic - control of one's body and of objects, timing, trained responses that function like reflexes. Found in dancers, athletes, actors, inventors, mimists, surgeons, karate teachers and the mechanically gifted.

6. Interpersonal - sensitivity to others, ability to read the intentions and desires of others and potentially to influence them. Includes consideration of others. Found in politician, teacher, religious leader, counselor, shaman, salesman, manages and "people people."

7. Intrapersonal - self-knowledge, sensitivity to one's own values, purpose, feelings, a developed sense of self. Identified with the novelist, counselor, wise elder, philosopher, guru, person with deep sense of self.

Gardner does not develop a curriculum for instruction in each of the intelligences and he does not provide a learning theory within which to enhance the intelligences. That is left for others. Nevertheless, when reconsidering several of the pedagogical principles espoused in previous sections, there emerges a mosaic of a potential elaboration of a strategy for developing the intelligences within the framework of traditional schools, communities and corporations. (This will be discussed below in the section on "Integrative Learning" which is the application of the Theory of Multiple Intelligences).

If we turn back in our discussion and look at the sort of thinking or problemsolving environments of the enriched environments of the Rosenzweig and Diamond studies, one can imagine the kind of stimulation to the brain which included the above "intelligences" in both a multiplicity of dimensions and multi-modalities of the seven intelligences outlined above.

The Enriched Brain Model argues that intelligence, performance, brain weight and chemistry are all interconnected. Under Gardner's view, learning environments which include instruction in all of the intelligences, enhancing strengths and uplifting weaknesses is a framework for, perhaps, the physiological enhancement of optimal brain function. As such our educational environment might shift from expectations to expectancy; from skills, competencies and tools to vision, purpose and direction. It might provide a new educational policy metaphor to move beyond the "bell curve" and beyond the 5% brain function.

SECTION SEVEN - INTEGRATIVE LEARNING - AN APPLICATION OF THE THEORY OF MULTIPLE INTELLIGENCES

I have a special feeling about the the "Integrative Learning Theory" as one of its originators and as a co-author with Peter Kline of "The Unification Theory of Modern Education" which is a comprehensive re-conceptualization of economic theory, learning theory and community regeneration.(70) I mention the latter, because if there were space and time, I would have included the Unification Theory in this discussion.

In many respects what has gone before in each of the sections provides a series of building blocks for what I call Advanced Learning Technologies. They are technologies, precisely because they have both theoretical implications and practical consequences in terms of the processes which are developed in order to implement them within educational practice. Integrative Learning is woven with a variety of different threads from the previous theories and strategies into a fabric which holds great promise for reforming the educational system within this generation and for all of our people.

As has been indicated in this review, research in Learning Styles, Neurosciences, Guided Imagery, Transpersonal Psychology, Suggestology and The Theory of Multiple Intelligences offers a completely new vision, purpose and direction in which all students can develop their human potential in terms of their own heritage and culture. As opposed to being "re-invented" into the Euro-centric model of learning with the high priest "intelligence" being narrowly focused on a single concept of language, math and logic, both the challenge and opportunity for implementing advanced learning technologies is upon us, notwithstanding the compelling need to move in a new direction for the sake of the future of our young people and the next generation of of the workforce-learningforce.

Integrative Learning is a system of "learning how to learn". It is designed to enhance the mental performance of students, adults and learners of all categories, as well as to improve the mental performance of teachers and instructors. Integrative learning includes the theoretical framework outlined in this discussion, but is grounded in the axis concept of the Theory of Multiple Intelligences. In its training and implementation dimension, Integrative learning seeks to develop the skills and dispositions among instructors to assist their students to perform above acceptable levels of accomplishment, regardless of grade level or job competence.

In short, it is a system of training faculty to achieve far more from their students, in much less time and with greater enthusiasm, joy and cooperation.

Although Integrative Learning is an advanced learning technology which combines theories, techniques, strategies and curriculum from a variety of disciplines, fundamental to it is a systematic application of the Theory of Multiple Intelligences as developed by Harvard's Howard Gardner, and as detailed in his book *Frames of Mind - The Theory of Multiple Intelligences*.

It combines a series of strategies and techniques designed to accelerate and enhance the acquisition of knowledge and skills through a multi-modal teaching approach. It brings an element of joy and thriving to situations which were previously tedious and depressing. A learning environment is mutually created between teacher and student that enables learning to become a joyful experience. It is a neurological approach allowing the brain hemispheres, learning styles, states of consciousness and multiple intelligences to become vividly and positively activated as part of the daily classroom experience.

Results from several studies show that in environments constructed with proper teacher training, students learn two to five times as much material in half the time with great zeal and enthusiasm about performing on standardized tests.

One such example is in Chicago at the Guggenheim Elementary School where the principal, Mr. Michael Alexander summarizes his experience after his teachers were trained in Integrative Learning:

"The Simon Guggenheim Elementary School, of which I am the principal. is in an economically depressed area in the southside of Chicago. It has about 400 students and 21 teachers in Kindergarten through eighth grade. Soon after I became principal three years ago I had the opportunity to use some State Title I funds to improve the school. Realizing that the school's dedicated teaching staff was its greatest asset, I decided to find the best way to upgrade their skills and morale. I hoped to provide them with something dynamic, which would give them a common experience and point of view to draw on in their teaching. Having had some interest in accelerated/Integrative Learning, I sought out someone who could train our staff. The expert recommended to me was Peter Kline, the genial dynamo of Integrative Learning.

The teachers, whose average tenure was twenty years, were skeptical at first. But it was agreed that there would be no pressure on them to use the Principles and techniques of Integrative Learning. It was up to them to apply what they found valuable. As principal, I would support their efforts by introducing orderly and disciplined environment into the school so the students could focus more effectively on this new way of learning and back up The Integrative Learning workshop with other training. They would receive thirty hours of training, away from the school while substitutes paid for by school replaced first one half and then the other of the entire staff.

The teachers loved Peter and embraced Integrative Learning with great enthusiasm, and the rest is history-or at least the beginning of a new era of achievement and hope for our students at our school. The impact on the school even in the first year was dramatic. Our student attendance rate rose to 94%, a very impressive rate for an inner city school. And our growth rate in reading and math rose spectacularly.

By the end of the first year after the introduction of Integrative Learning, the percentage of our students advancing a whole academic year in reading increased 103% over the previous year. and for reading and math combined the overall gain was 83% over the previous year. Projecting this gain through nine years of elementary schooling, our students would exceed the national norms at graduation be a full two grade levels, graduating from the eighth grade with an average ability in both areas of nearly eleventh grade. And we feel the program is far from reaching its ultimate potential.

Other results have been more subjective. Some of them are dramatically and movingly recounted in this book. I remember when the teachers returned to school after first receiving the training, some of their students asked, "What happened to our teachers? They're so much nicer now!" I am told this response is typical when teachers return to class after this kind of training." (70)

There are other mature applications of Integrative Learning, including the Paul Robeson High School in Chicago, the Detroit Center for Professional Growth and Development, The Graduate Education Department at Cambridge College, Massachusetts, Prince George Community College, The Boston Public Schools, Paradise Unified School District, California and Syracuse University where similar results show the potential for advanced learning technologies in the classroom, in the training centers and in the corporate board room.

It might be useful to outline, in general, how Integrative Learning(referred to below as "IL") differs from traditional approaches in reference to the seven intelligences.

As discussed in other sections above, one can easily note the traditional reliance on behaviorism, specifically the reluctance to either explain or understand any mental activity in terms of the processing of the brain. Skinner's "S-R" model was as pervasive in its influence on educational focus on outcomes, objectives and competencies as was Binet's narrow view of intelligence.

Because the traditional model of intelligence as involving only the linguistic and logical parts of the brain has been so deeply ingrained in teacher education, classroom practice and learning theory, the use of the other five distinct intelligences in the classroom room has been relegated, for the most part, to frill activities, and has been trivialized. This belies the fact that one must think of all seven intelligences as equal contributors or resources to the education of the individual. As a result, only two sevenths of the total intelligence of the mind is developed in traditional education, with results that harm the most successful learners, while depriving some learners, with a preference for the intelligences not preferred by traditional education, of any chance of learn in the classroom at all.

The first two intelligences, LINGUISTIC AND LOGICAL/MATHEMATICAL are the two that are emphasized in traditional education. Both are typically approached sequentially, spelling out a step-by-step approach in reading, writing and mathematics. On the other hand, IL is global. For example, an IL algebra class might teach quadratic equations on the first day, giving students an overview of how they are structured, and then allowing the students to recapitulate the various processes needed to reconstruct the quadratic equation. This approach flies in the face of the "concrete to abstract" principle of learning procedure.

The third intelligence, MUSICAL, is usually ignored in traditional education. In IL, music is used in several ways. Songs similar to the alphabet song, are introduced to teach much of the material which must be learned by rote. Raps are used for similar purposes, as well as to motivate students and orient them to the course itself. The most striking use of music is the concert session, during which material to be learned is read to a background of classical music, which allows it to enter the long term memory directly. Dr. Lozanov's contribution is most evident to Integrative Learning. Through this means the teacher is able to save an enormous amount of time in drill and review, since the students learn the material easily and remember it for a long time after it has been formally studied. Traditional education includes music primarily in two ways: music appreciation and music performance. Neither of these is integrated with academic subject matter in conventional classrooms or training environments.

The fourth intelligence, SPATIAL OR VISUAL, is used by teaching students to symbolize concepts to be learned in pictures, posters, models, diagrams and mind maps, as well as information maps and concept maps. These spatial orientations for models of information help students "decode" information and enable them to organize ideas in global relationships and easily remember them later. Also, by causing them to move material from a linguistic to a spatial orientation, they help the student to process the material through a different part of the brain, thus deepening the understanding of it, while making it more memorable. Research indicates that visual material is remembered many times more efficiently than linguistic material. This process is reinforced by guided imagery, which teaches students an effective internal visualization method. Guided imagery is much more necessary in contemporary education than it was a generation ago because of the influence of television, which tends to rob young learners of the normal development of internal visualization stimulated by reading and by radio programs. Traditional education uses pictures, maps and other classroom decorations. These visual aids are seen as supplementary cues within a predominantly linguistic environment, but they are not synthesized into the conceptualization process itself. In traditional education, art appreciation and art creation are also taught, but again without relating them to the creation and application of academic structures and concepts.

The fifth intelligence, BODILY-KINESTHETIC, is almost entirely ignored by traditional education, except in the gymnasium, where it seldomly has any relationship to academic material whatsoever. In the IL classroom it is used to establish pre-verbal conceptualization for basic ideas in mathematics, language, socialization and science. This is done by having the class model such relationships as the multiplication tables, the diagramming of a sentence the rotation of the planets, or the contributing forces to World War I. By stimulating the kinesthetic intelligence it becomes possible to bring kinesthetic learners into the mainstream of class activity, while presenting the other learning modalities with an additional dimension for understanding the material. These "living sculptures" are more real for the students than such models as rods because they involve the whole person of the student in a dramatic assumption of the role of some part of the concept being studied. As a result students learn the concepts much faster and more reliably than is possible by other means.

The sixth intelligence, INTER-PERSONAL, is largely ignored in traditional education, being left to peer group behaviors largely carried on outside of formal class periods. In IL, many class activities are designed to help students relate to each other more effectively. Within training sessions, there are published, detailed descriptions of several of the techniques used to do this. These are included in a manual provided to trainees which include such techniques as: good and new; think and listen; go-around; speak out; self estimation and validation circle.

The seventh intelligence, INTRA-PERSONAL, is developed through providing opportunities for students to interpret new information in the light of their own previous experience, so that the material learned is always adjusted to the student's personal psychic needs. This is accomplished through body sculptures and skits, in which, by playing the role of some aspect of the skit material, the student is able to develop a personal relation to it which is then pursued in creative writing exercises and discussions in class oriented toward personal responses to new ideas. This intelligence is almost entirely ignored in traditional education, which often makes the assumption that the intra-personal intelligence has no place in the classroom. This notion is advanced by the assumptions behind the behaviorist model of learning, which rules out, ignores or trivializes subjective experience. We find that the development of this intelligence is crucial to help unmotivated students find themselves, and thus reduce the sense of worthlessness which so often contributes to the attrition phenomena.

So often, theories and their application are not clearly spelled out in terms of either their potential for replication or their training structure. Consequently, as an example of how Integrative Learning is implemented within staff development training, the following is provided as a brief description of the staff development model which is currently under the process of "validation" review by the New York State Department of Education. The purpose of achieving "validation" status is to provide a common framework and research base for state-wide diffusion across interested school districts and training sites.

Integrative Learning Staff Development Model, Level 1:

The staff development is forty hours of training spread over (a) five, eight hour days (b) four, ten hour days (c) two weekends (d) four evenings plus a weekend. The first day presents theoretical considerations. The second day lays out basic structures used in the classroom. The third day explores how those structures are organized in class plans. The fourth day provides training in specific techniques. The fifth day gives the teachers an opportunity to develop and present actual class plans. A more detailed list of activities follows.

Administrative Implications

The principal should be trained in level 1 of the teacher training in IL. In addition, the principal should receive a day and a half training especially designed by Syracuse U. on how to introduce change into a school environment. Once the teachers in the school have been trained, the principal's main job is to provide understanding support for them in adopting the program into their classes.

Commitment by an institution or school district

The district agrees to pilot the program with a single school, a selection of teachers from many schools, or several participating schools. Additional commitment may be developed from the district's satisfaction with its own pilot project.

How many teachers? 25 to 30 in a group.

Fees: Training is conducted under the auspices of Syracuse University, University College, Center for the Study of Learning and Retention. Fees for the forty hour training and contract rates and site variations have been negotiated with different districts.

Requirements for teacher's preparation time. This varies from no change, since the teacher's normal time is used differently, and materials can be prepared in class with the help of students, to entire summer devoted to preparation, or perhaps an extra free period made available during the day for preparation. In addition, it is advisable to make support group time available to teachers.

When is the training done? The forty hour training is accomplished in several alternative ways depending on the circumstances of a school district, and can be included in the ongoing school year. This ranges from one full week, Monday through Friday to two consecutive weekends or two non consecutive weekends over a period of a month.

What specific materials are necessary for training and classroom use?

For training: a flip chart, a tape recorder.

For classroom use: appropriate texts, ball, puppets, various dramatic properties, posters, music tapes, tape recorder. Most of these materials can be made or acquired by the teachers themselves.

"Should teachers implement the program in all content areas or only in reading and math?" is a question often raised by faculty. We have trained in all content areas, but our data is in reading and math. There are many approaches to planning in a district. And the IL staff development model is applicable to virtually all of those approaches. Whether a district is operating under a shared governance structure on a building by building basis or working specifically in areas of math and reading as priority areas, or developing faculty expertise across the content areas, it can be accomplished. A preferred model in elementary education is train faculty of one building to provide an infrastructure of support among the teachers in all content areas. The preferred model is what was implemented at the Guggenheim Elem school, the results of which are the basis of this validation.

What program monitoring is advisable by Syracuse University? Follow up programs, classroom visitations, in depth interviews of teachers a few months after they have been trained, and research projects. We recommend a follow up on-site evaluation by the trainers, including additional follow up training sessions in curriculum applications. At a minimum, this is an additional forty hours of training.

The role of the principal in monitoring and evaluation is very important to sustaining commitment to Integrative Learning at the building or project level. This is best done in follow up sessions conducted by the original trainers over a two day period following a three month interval following the forty hour training, and repeated three times the first year. Here the teachers are brought into relationship so they can share successes and plan additional steps in adopting the materials. The teachers themselves learn to monitor the process and achieve self evaluation through the self estimation process, a non-threatening group self evaluation process endemic to integrative learning.

In conclusion, it is important to recognize that as a theoretical framework, Integrative Learning is in a maturing stage, with a great need for additional research at several levels of complexity, not the least of which includes its implication for gerontology programs with the elderly, social-welfare and pre-employment training, community re-generation, health and hardiness, alternative personal programs to alleviate drug use, and the lasting effect of turning the tide of attrition within high schools.

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